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**Colpoperineorrhaphy**  
and  
**The Structures Involved**

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**The Vagina and Perineum**  
and  
**How to Mend Them**

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**Byron Robinson**

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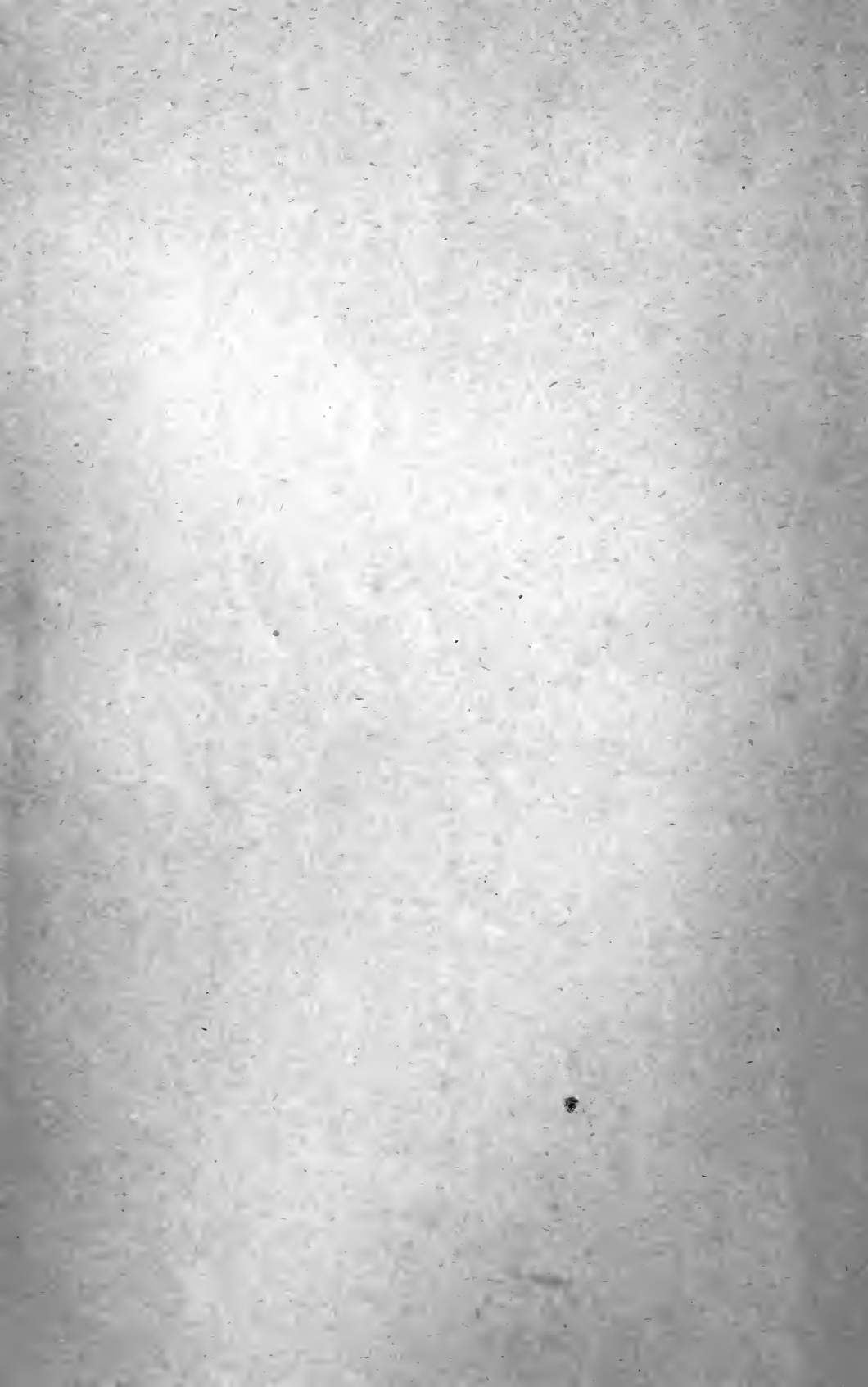
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# COLPOPERINEORRHAPHY AND THE STRUCTURES INVOLVED

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THE VAGINA AND PERINEUM AND HOW  
TO MEND THEM

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BY

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CHICAGO, ILL.

Author of "Practical Intestinal Surgery," "Landmarks in Gynecology,"  
"Life-size Chart of the Sympathetic Nerve," "The Peri-  
toneum, its Histology and Physiology."  
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## DEDICATION.

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This monograph, prepared for presentation before my fellows of the American Medical Association (Denver, June, '98) and published in *The Journal of the American Medical Association*, is respectfully dedicated to the medical profession with the hope that my labors, surgical researches, and experiences as herein outlined will be of direct interest and help to them and indirectly, through them, to suffering and needy humanity.

THE AUTHOR.

## PUBLISHER'S PREFACE.

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We have taken great pleasure in reproducing this book from the pages of *The Journal of the American Medical Association*. Like everything that comes from Dr. Robinson's pen it is full of good things and evidences an amount of labor that few are willing to give to the work they undertake to do. We therefore heartily recommend it to every physician who thinks that he can or might be helped in the treatment of the class of cases to which it refers. The drawings for this profusion of illustration were made from life during the process of the author's numerous operations in his extensive clinics, and are as true and helpful as it is possible for such cuts to be. These, with the full and complete text, should be of great help to those who have not reached a perfectly satisfactory technique of their own, and must certainly be of interest to all.

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## COLPOPERINEORRHAPHY AND THE STRUCTURES INVOLVED.

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The structures involved in the repair of a defective perineum are muscles and fasciæ. The operative procedure consists in denudation with coaptation or flap-splitting methods. Notwithstanding the successful claims for the varied surgical methods of colpoperineorrhaphy the anatomical basis is neither generally nor perfectly understood. It is probable, however, that the essential success lies in the reunion of the separated levator ani muscle by means of its fasciæ superior and inferior with some other fasciæ, and also that this success has been chiefly due to deep suturing. The object of this essay is to demonstrate that the chief factor in successful colpoperineorrhaphy is the restoration by the aid of deep sutures of the fasciæ, especially the levator ani fasciæ, superior and inferior.

The muscles of the pelvic floor may be divided into two classes: *a*, the deep layer—the levator ani coccygeus and pyriformis; *b*, the superficial layer—the transversus perinei, bulbo-cavernosus and sphincter ani externus. A peculiar characteristic of the muscles of the pelvic floor, and one which demands respect in colpoperineorrhaphy, is the extensive fascial attachments of one or both ends of the muscles. The levator ani, the bulbo-cavernosus and the transversus perinei have a fascial attachment. We will consider in detail the muscles and fasciæ involved in colpoperineorrhaphy. The basis of this labor is a careful anatomic investigation with considerable clinical and surgical experience.

## THE LEVATOR ANI MUSCLE.

The levator ani muscle is perhaps the most difficult to understand as regards its form, insertion and function. The origin of the muscle is sufficiently plain, and is considered established by anatomists. Few agree as to exact insertion, even at this late day, and opinions vary as to the exact function, form and insertion of this muscle. My own investigations demonstrate that there is a foundation for these varied opinions.

1. The insertion and origin of the levator ani vary as to the extent of distinct muscular loops which embrace the rectum and vagina, as to the tendinous raphe (between muscle loops and distal ends of the coccyx), also regarding the precise relation to the vaginal wall, whether muscular or connective tissue, and also as regards the exact relations to the muscle of the lower end of the rectal wall. Moreover, its partial fascial origin and insertion is sure to endow the extremities with varying appearances as to the length of the fascial or tendinous conditions; in other words the distance of the red muscular fibers from the extreme origin and insertion of the levator ani vary. Perhaps this variation in insertion may be explained by considering the levator ani as a rudimentary muscle and to be disappearing with the tail. Its double fascial accompaniments complicate its origin and insertion, as well as the interpretation of its function.

2. The various opinions as to the form of the levator ani are explained by differences as regards sex idiosyncrasies of individuals, disturbances from gestation and parturition, variation of the shape of the pelvis and fascial insertions and attachments.

3. The different views as to the function of the levator ani lie in confusing its function with the levator ani fascia, superior and inferior, in exaggerating its size and attributing to it function and utility be-

longing to other genital supports. It is especially erroneously inferred that a muscle will act as a continuous tensionized support for any viscus. The knowledge of the levator ani muscle is fragmentary and difficult of access. Its dissection is far from easy and its adjacent relations are complicated. The muscle does not resemble a funnel with the rectum or vagina at the bottom or apex, but is more similar to a sling, a flat loop or a horseshoe, which does not pull the rectum or vagina directly upward, but draws the two canals forward and upward toward the pubic cord.

The muscular loop of the levator ani muscle resembles a horse's collar encircling the rectum or the vagina. In the female it vigorously controls two canals—rectum and vagina—yet its control of the vagina depends on that of the rectum. The rectum being forced forward against the middle of the posterior vaginal wall produces the H-shape to the vagina. The excess of vaginal wall is compelled to fold at the sides producing the upright columns of the H. It is very thin. In an excellent specimen which I dissected from a good-sized woman the levator ani muscle is so thin as to be really membranous, and the muscular band between the vagina and rectum is but a few lines in thickness. It is really a pelvic diaphragm.

The muscle should be considered as to its origin, course and insertion.

*Origin.*—The levator ani muscle arises: from bone, from the posterior surface of the pubis and ischial spine; or from fascia, arcus tendineus and vesicopubic ligament. The bony origin is the posterior surface of the pubic bone and ischial spine. The larger portion of the levator ani of bony origin arises from the posterior surface of the pubis. It begins about half an inch from the symphysis and one and one-half to two inches below the pubic crest. This point of origin is about two fingers wide or one and

one-half inches, and does not meet its fellow of the opposite side, one-half to one inch existing between them on the posterior surface of the pubis, which is filled in by the obturator fascia. The bundle of muscles originating on the posterior surface of the pubis passes downward and backward to embrace the vagina and rectum. This is the pubic sling or horseshoe loop,

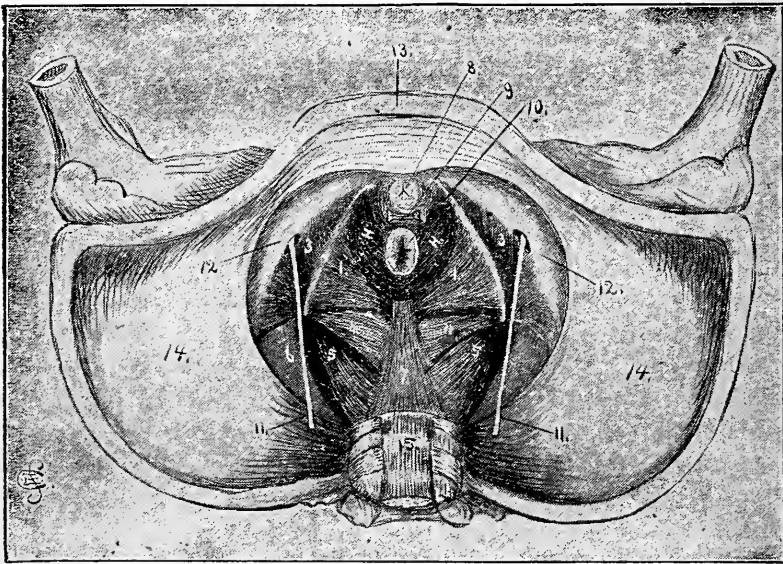


Fig. 1.—(Robinson-Scholer.) This cut is drawn from a female pelvis dissected by the author and intended to show the muscular floor of the pelvis with fascia dissected off. 1, 1, the levator ani muscle; 2, 2, the white line or origin of the levator ani; 3, 3, the obturator internus muscle; 4, 4, the coccygeus muscle; 5, 5, the pyriformis muscle; 6, 6, the inner wall of pelvis; 7, 7, sacrum; H, H, the horse-shoe loop of the levator ani muscle, drawn darker; 8, the Y-shaped urethra; 9, the vagina, cut close to the pelvic floor, whose wall does not flare like the radial wall; 10, 11, 11, the obturator nerves; 12, 12, inner wall of pelvis; 13, pubic crest; 14, 14, iliac fossa; 15, last (5th) lumbar vertebra.

which is quite thick and strong in some cases, and very thin and membranous in others. The margin of the loop, which is applied against the sides of the vagina and rectum, is often the thickest part of the

muscle. The muscular bundles of the horseshoe loop join those of the opposite side of the levator ani posterior to the vagina and rectum without an intervening perineal tendon or raphe. In some dissections it is absolutely plain that no tendinous raphe exists, while in others it can not be told.

The smaller portion of the levator ani of bony origin is from the ischial spine immediately anterior to the origin of the coccygeus muscle. Quite a distinct strip one-fourth to one-half inch wide comes from the ischial spine, and can be plainly followed by the eye to the horseshoe loop.

The ligamentous origin is from the anterior ligament of the bladder (ligamentum pubo-vesicale) and from the arcus tendineus (white line). The fibers of the levator ani which arise from the ligamentum pubo-vesicale are of little practical importance. The white line extends in a slightly curved direction from the posterior lateral surface of the pubis, over the obturator foramen to the spine of the ischium. The anterior end lies two and three-fourths inches below the ileopectineal line, with a length of about four inches. The white line (arcus tendineus) is a part or an extension of the anterior true ligament of the bladder, a thickening of the levator ani fascia superior. In the white line, the muscular fibers arise as fine tendinous bands, and may show their reddish muscular nature at the white line or a short distance from it. The muscle may shade into a flat tendinous layer before it reaches the white line. The proximal tendon of the levator ani muscle varies much as to its relations with the white line. It may arise below it as well as from it. The white line may project into the pelvis as a tendinous fold, and be capable of being separated from the origin of the muscle.

The course of the fibers of the horseshoe loop of the levator ani muscle is backward and downward

in two fleshy bundles, the smaller to the side and posterior surface of the vagina, and the larger to the side and posterior wall of the rectum. The loops which pass along the sides of the vagina seem to be attached to the vaginal walls by connective tissue only, while the loops of muscular fibers which embrace the rectum interweave with the muscular

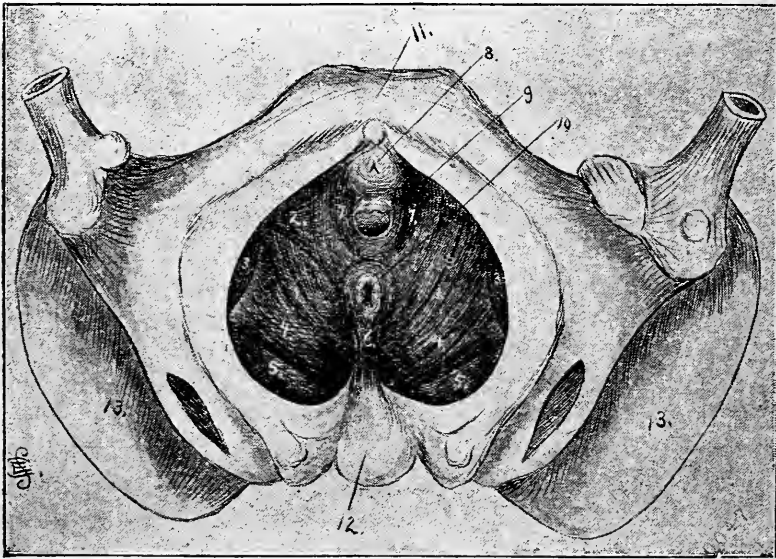


Fig. 2.—(Robinson-Scholer.) This is a cut drawn from a female pelvis dissected by the author. It illustrates the inferior surface of the pelvic floor. On the left side (in the fig.) the levator ani fascia inferior is not dissected off, while it is on the right side, showing the inferior surface of the levator ani muscle. 1, 1, shows the levator ani muscle with its parallel bundles; 2, 2, the levator ani fascia inferior; 3, 3, the obturator internus muscle; 4, 4, the coccygeus muscle; 5, 5, the gluteus maximus; 6, 6, ano-coccygeal structure; 7, 7, the horse-shoe loop of the levator ani, showing some muscular bundles coursing between rectum and vagina. It is not so large on the inferior surface as it is on the superior surface of the pelvic floor. 8, urethra; 9, vagina; 10, anus flaring; 11, pubic arch; 12, sacrum; 13, flaring ilium.

bundles of the rectal wall, forming a strong connection. The part interwoven in the rectal wall acts as an elevator. It would appear that in some cases the

loops of the levator ani interweave with the muscular fibers in the wall of the vagina. The part of the levator ani which passes between the vagina and rectum is a small, thin band, one-sixth to one-eighth of an inch in width, which arises from the external part of the pubic origin and passes over the large belly of the muscle to gain the rectovaginal situation. Its relations to the wall of the vagina are very close if not interwoven with its fibers.

The part of the muscle of fascial origin which arises from the white line, passes backward and downward, becoming part of the levator loop and partly inserted in the tendinous perineal raphe and the last bone of the coccyx. Many of these fibers pass downward in a curve, and when near the median raphe they turn acutely backward to become inserted into the coccyx. A few of the muscular fibers arising from the white line, as well as from the horseshoe-shaped loop, together with some from the ischial spine, embrace the rectum. The part of the levator ani arising from the ischial spine becomes inserted chiefly in the coccyx. Yet one may observe one-fourth of an inch in width pass around the rectum with no intervening tendinous raphe.

The part of the levator ani muscle of special interest to the gynecologist is the two-fingers wide, horseshoe-shaped sling which arises from the posterior surface of the pubis and passes backward and downward to embrace both rectum and vagina. It is the belly of this loop which gives the rectum its forward curve just before the anal end is turned backward. It is the sphincter portion of the muscle. It is this part of the muscle which becomes hypertrophied in vaginismus. It is the portion of the muscle torn and separated in lacerated perineum. It is the portion of the muscle which retards labor, creates vaginal spasm and may prevent coition, and in rare



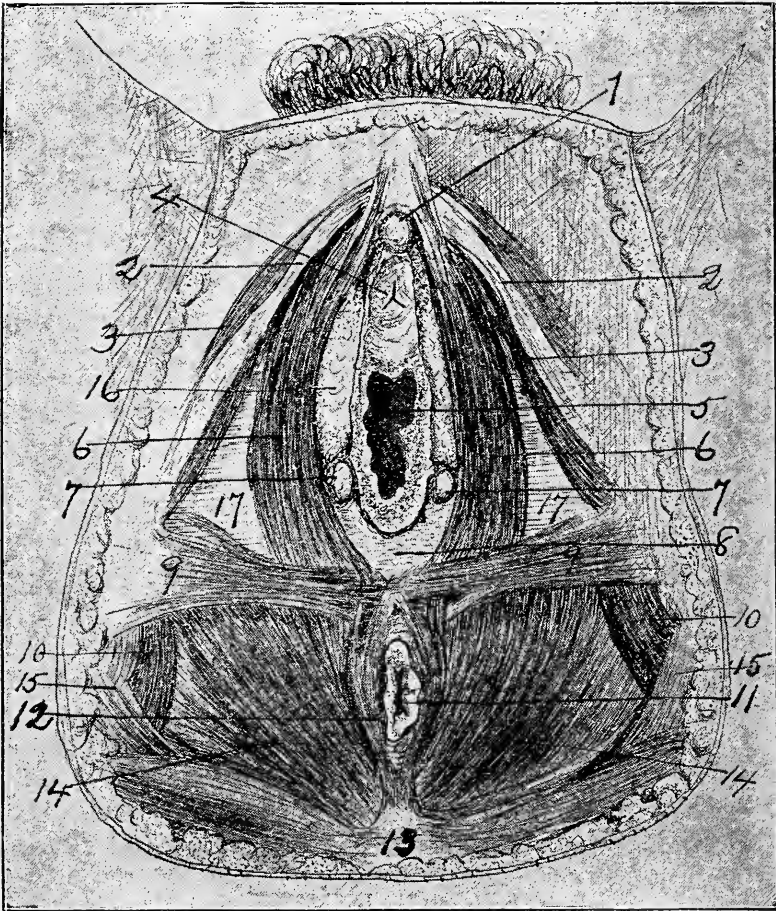


Fig. 3.—(Author.) This figure I drew semi-diagrammatically to illustrate the general view of the pelvic outlet. 1, clitoris; 2, crura clitoridis; 3, recto clitoridis muscle; 4, urethra; 5, orifice of vagina; 6, bulbo-cavernosus muscle; 7, vulvo-vaginal glands (of Duvernoy, of Bartholin, of Tiedeman); 8, posterior vaginal commissure; 9, transversus perinei muscles; 10, obturator internus muscle; 11, anus; 12, sphincter ani externus; 13, coccyx; 14, levator ani muscle; 15, great sacrospinous ligament; 16, the bulb of the vagina; 17, deep layer of superficial perineal fascia.



cases prevents the penis from escaping until relaxed by an anesthetic. In most cases the levator ani behind the rectum may be divided into three quite distinct parts, viz., *a*, the part which is connected to the last bone and fascia of the coccyx. The fibers accompanying this portion of the muscle originate chiefly from the posterior end of the white line or at the ischial spine. *b*. A portion of the muscle forms a median tendinous raphe for about one-third of an inch immediately in front of the coccyx. *c*. The portion of the muscle immediately behind the anus, about three-fourths of an inch wide, has no intervening tendinous raphe (not always distinct) and consists of the belly of the loops which originate and insert on the posterior pubic surface. In other words, the muscular fibers of each side anastomose, forming the horseshoe-shaped loop, with no intervening tendinous raphe. Some of the loops intertwine with those of the sphincter ani, which pass back to the tip of the coccyx, also some of the muscular fibers of the sphincter ani externus are continuous with the loops of the levator ani. The fibers of the levator ani originating from the white line pass backward and downward, but on arriving at the median raphe, many of the fibers turn sharply backward to be inserted into the coccyx, and soon become tendinous. The levator ani fascia superior is not very intimately attached to the muscle, and may be compared to the fascia transversalis. The levator ani fascia inferior is adherent to the muscle.

Deductions in regard to the levator ani muscle may be numerous. Certain practical considerations may be drawn from a careful study by dissection and in gynecologic practice. As it was originally a muscle of the tail it is becoming vestigial in man, shown by its fascial connections. From the origin, course and insertion of the levator ani muscle, it must be viewed

as the all-important muscle of the pelvic floor.

The levator ani fascia superior is the real visceral support. I think it was Dr. Meyers, a German physician, who first happily named it the pelvic diaphragm. In many subjects it is membranous. The normal

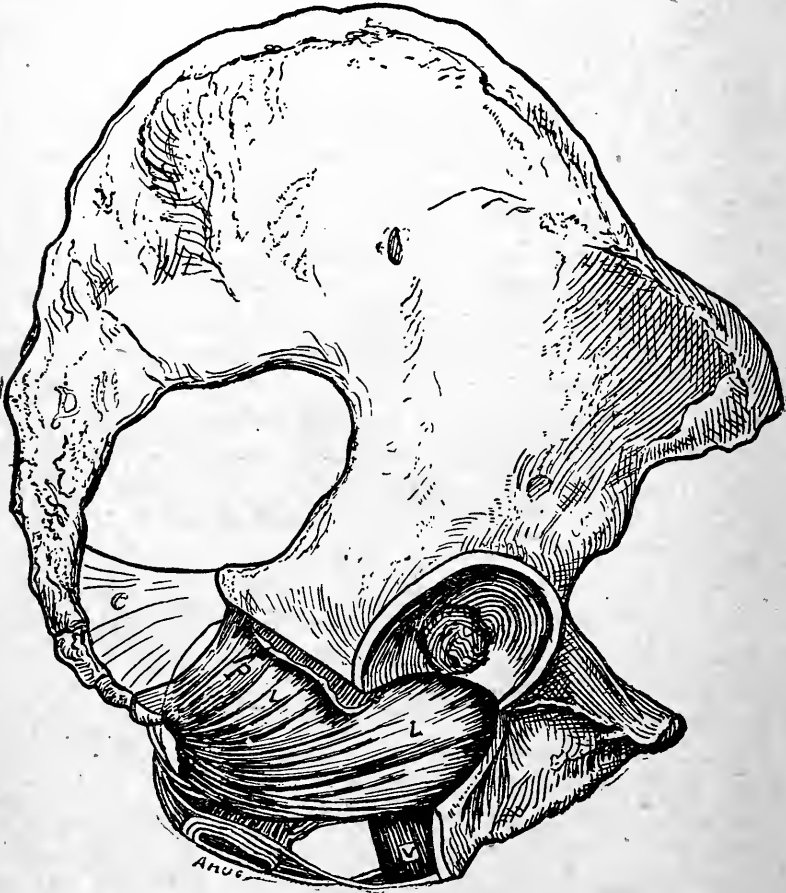


Fig. 4,—(Luschka, 1864.) Redrawn and modified represents a view of the levator ani muscle. L, L, the modification of Luschka's figure consists in magnifying the rectal curve made by the levator ani muscle; C, is a continuation of the levator ani muscle backward, drawn lightly; V, vagina. The grip on the rectum by the horse-shoe sling of the levator is here plain. The levator ani fascia inferior, p, is shown rolled up.

muscle has the shape of a boat, and when this boat-shape becomes cone-shaped, the pelvic floor is impaired. The levator ani is composed of many muscular bundles coursing chiefly parallel to each other, but also at varying distances. The bundles are flat, ribbon-like, and of a bright red color. The bundles of muscular fibers are held at greater or less distance from one another by collections of fat or connective tissue in varying degrees. Fenestra or apertures are commonly observed between the muscular loops. The capacity of the bundles of the levator ani muscle to separate and reunite without injury, serves a useful purpose in labor, when rapid and wide distention of the pelvic floor may occur. Too many figures illustrate the muscle as a distinct plane with no parallel gaps between the bundles.

The levator ani (the deep muscular layer of the pelvis) is connected to the external sphincter ani of the rectum and vagina (the superficial muscular layer of the pelvis) and by this muscular connection to the perineal body (the punctum fixum), the deep and superficial muscular layers of the pelvis are brought into intimate relations of much utility. A few fibers are lost in the perineal body. The levator ani is in closer organic relation with the rectum than the vagina, because the rectum requires more frequent and perfect evacuations than the vagina. It is chiefly a sphincter muscle. The weakness of its origin, insertion and direction of its fibers is in accordance with its fading out of existence.

The forward curve of the rectum is due to the horseshoe-shaped loop of the levator ani, which originates chiefly from the posterior surface of the pubis. By the contraction of the lower, stronger fibers of the levator, the lower portion of the rectum is forced against the perineal body, which compels the anus to turn backward and to evacuate its contents.

The levator ani, on account of its shape and size, leaves deficiencies in the pelvic floor, which are filled in front by the bulbo-cavernosus and behind by the coccygeus muscle, its continuation backward.

The palpable rounded edge of the levator ani lies three-quarters of an inch above the anus and three-quarters of an inch above the vaginal opening, making

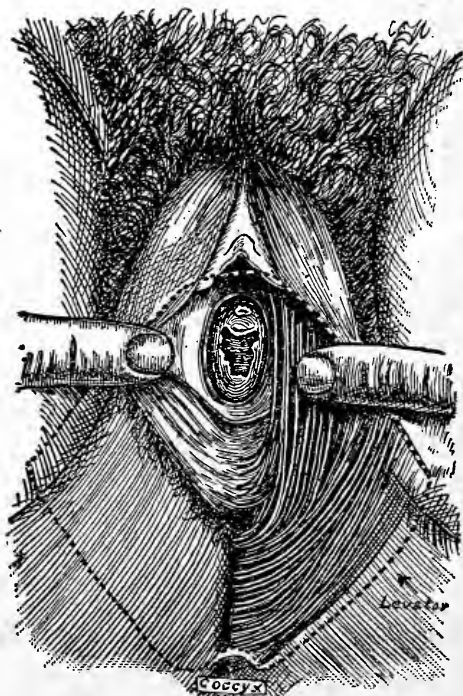


Fig. 5.—(Dickinson, 1889.) The levator ani as seen through the skin; the outlet of the pelvis is dotted and the direction and course of the chief muscular bundles of the levator ani marked out.

the muscle, in fact, a regulator of the external openings of these two canals. Normally the orifices of the canals are always closed. They remain open only by internal or external force or from trauma.

The levator ani will lift from five to twenty pounds, averaging about ten as noted by Dickinson. Its

strength soon tires out assistants in vaginal hysterectomy. From its insertion into the perineal body the external sphincter, post-rectal raphe and coccyx, it draws forward the post-vaginal structures of the pelvic floor. In the excellent work of Savage, he names the portion from the principal bony origin, pubo-coccygeus. This is erroneous, as these loops do not pass as far back as the coccyx—do not even come in contact with it. The levator lifts the rectum and vagina forward and upward to the pubic arch. The muscle has but limited influence on the sides of the rectum. The muscular fibers composing the horseshoe loop exercise the chief influence over the rectum, while the portion of the muscle arising from the white line (fascia) serves its purpose by holding the pelvic diaphragm in relation prepared for any immediate action, with its superior and inferior fascia it makes a tense floor for the superimposed viscera.

The levator ani fascia superior and inferior lends the muscle its greatest utility by increasing its strength and also producing harmonious action in its function. The horseshoe sling is inseparably blended with the sphincter ani externus. The levator ani produces the H-shaped condition of the vagina and its puckered or constricted appearance at the orifice. The muscle becomes hypertrophied during pregnancy and vaginismus. It resists the head in labor to a surprising degree. It may be easily observed in slow labor, when, if small forceps sufficient to overcome the tension of the muscle be applied, labor proceeds rapidly.

The comparison of the diaphragm and levator ani, as to the capacity for strength, is in favor of the levator ani. Its strength varies much in different subjects. The best descriptions of the levator ani muscle are given by Henle, Luschka, Testut and Lesshaft. Hart and Dickinson have made excellent studies on

this muscle. Browning wrote an interesting article on the subject. The levator ani may be a rudimentary muscle, disappearing with the tail and in the evolutionary process of an erect attitude. This view may arise from the weakness of its origin, the direction of its fibers and insertion, as well as the requirement of the double fasciæ. It is unphysiologic for a muscle

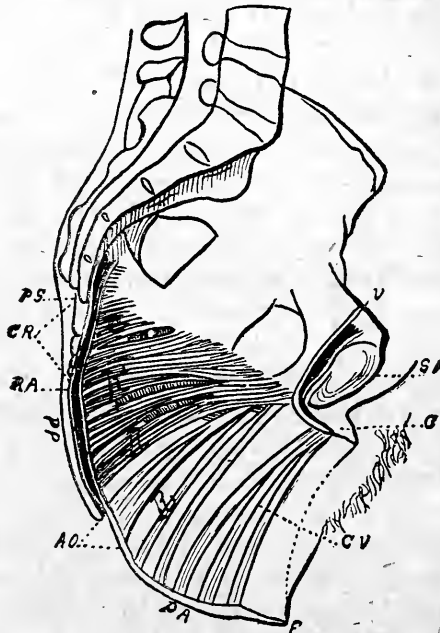


Fig. 6.—(Varnier, after Dickinson.) The distended levator ani. V, bladder; s, p, symphysis; c, clitoris; c, v, constrictor of the vulva; F, fourchette; P, A, anterior perineum; A, O, anus; P, P, posterior perineum; C, R, coccyx; P, S, point of sacrum; R, R, R, is on the muscle with its separated bundles, the middle R is on the strongest bundle. In this figure we observe how the muscle can save itself from rupture by the separation of its various fasciculi. It yields better than if it were in one connected sheath.

to produce constant support, hence the levator ani can not be considered a support for the viscera; it is rather a sphincter muscle.

The levator ani muscle is analogous to the buccinator muscle. Perhaps from an evolutionary standpoint

we may look on the levator ani as having three functions, viz.: *a*, of a sphincter; *b*, of an elevator; and *c*, of a tensor of the levator ani fascia, superior and inferior.

As proof that the levator ani is a sphincter, one need only introduce the finger into the vagina and request the subject to contract the muscle. Cruveilhier, Henle, Lesshaft and Budge insist that the levator ani is a sphincter of the anus and lower rectum chiefly, and not an elevator. That this muscle is an elevator one need only dissect it to find the muscle ending definitely in the walls of the rectum, and such terminating fibers, when in action, could only elevate the rectum. The horse in defecation illustrates that the levator ani is an elevator, as the rectal wall is elevated, the rectal mucosa everted and completely evacuated. As an elevator, it resists intra-abdominal pressure.

The levator ani appears as well developed in the male as the female, and hence labor does not appear to develop it. The levator ani muscle is greater in those animals with a tail, and originally its chief function was to aid in managing the tail, from which it would appear that as a tensor of the levator ani fascia superior and inferior, these fibers take an active part. They originate at a definite fixed point, lose themselves between the fascial blades and do not reach rectal or vaginal walls. When a muscular fiber neither goes to the rectum nor ends in its wall, it will not act as a sphincter, nor as an elevator.

Lesshaft and Roux divide the levator ani into two layers, viz., *a*, the inner layer, which is an elevator, and *b*, the outer layer, which is a sphincter.

#### THE INTERNAL PELVIC FASCIA.

The internal fascia of the lesser pelvis has a poor literature, and is not often described. As the pelvic

fascia has much to do with the permanent results of the flap or any perineal operation, I will write of it somewhat in detail.

The fascia of the greater pelvis, or that fascia lying superior to the ileopectineal line, is not here considered. The fasciæ, the planes of strong, fibrous tissue here under consideration, lie below the ileopectineal line.

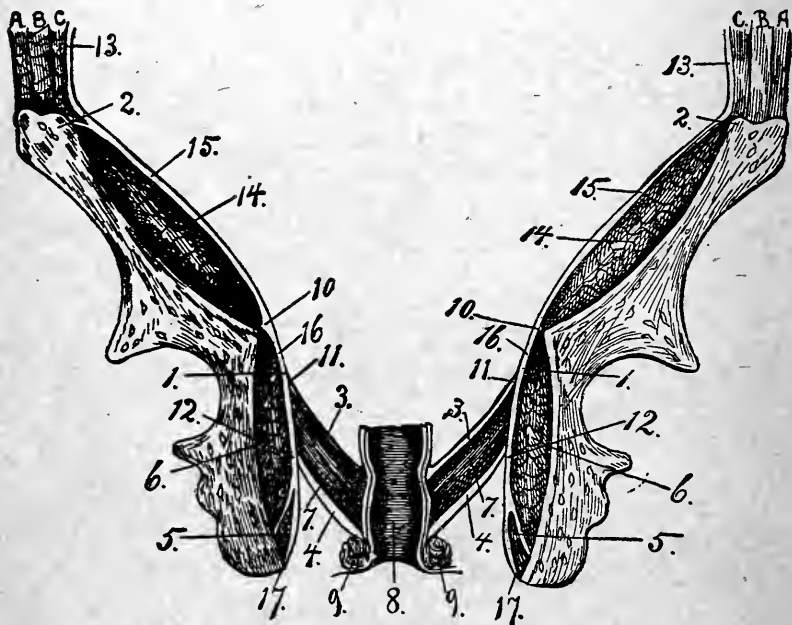


Fig. 7.—(Robinson-Scholer.) A diagram to illustrate the pelvic fascia, with a new nomenclature of same. 1, 1, white line; 2, 2, origin of transversalis and iliac fascia at the iliac crest; 3, 3, levator ani fascia superior; 4, 4, levator ani fascia inferior; 5, 5, Alcock's canal; 6, 6, obturator internus muscle; 7, 7, levator ani muscle; 8, 8, vagina or rectum; 9, 9, external sphincter; 10, 10, ileopectineal line; 11, 11, origin of levator ani fascia superior; 12, 12, beginning of obturator fascia inferior; 13, 13, transversalis fascia; 14, 14, iliac muscle; 15, 15, iliac fascia; 16, 16, obturator fascia superior; 17, 17, ending of obturator fascia inferior on the ischial tuberosity.

As a teacher of anatomy, I have always maintained that a fascia should be named according to the muscle or other structure with which it is in the most inti-



mate relation. I shall therefore apply this simple nomenclature to the fascia in the pelvis.

The fascia covering the obturator internus muscle will be termed the obturator fascia. As this fascia is divided by the white line extending from the posterior surface of the pubis to the ischial spine, we will call that portion of the fascia above the white line the obturator fascia superior, and that portion of the fascia below the white line the obturator fascia inferior. The fascia above the levator ani, originally named by Tyrrell the *rectovesicale*, and by Carcassone the pelvic aponeurosis, by others the vesical layer of the pelvic fascia, we will name the levator ani fascia superior, and that part of the fascia below the levator ani, the levator ani fascia inferior. The fascia covering the coccygeal and pyriformis muscles will be named after those muscles. The fascia covering the sacrum very naturally takes the name of the sacral fascia. The internal fascia of the lesser pelvis extends from the ileopectineal line on either side to the median raphe of the pelvic floor. It not only lines the pelvic walls and floor, but enters into intimate relations with the pelvic viscera. It is a strong, shiny, fibrous membrane, possessing a very varying quantity and quality. In a certain sense the fascia of the lesser pelvis should be treated as an independent structure, and not as a continuation of the iliac transversalis or other fasciæ. The ileopectineal line marks an absolute division between the iliac and obturator fascia.

The simplest plan is to describe the obturator fascia superior and inferior and to consider the obturator fascia as distinctly belonging to the obturator (internus) muscle, subsequently to consider the fascia of the levator ani superior and inferior, with a lesser consideration of the coccygeus, pyriformis and sacral fasciæ. The fasciæ lining the lesser pelvis are intimately connected with their respective associated muscles and

structures by strong connective tissue. The connection of the fasciæ with the peritoneum is not intimate, a thick, loose layer of connective tissue, richly laden with fat lobules, lies between the peritoneum and the fasciæ lining the lesser pelvis. This loose connection of pelvic peritoneum and pelvic fasciæ allows the easy and rapid spread of pelvic abscesses between the pelvic fasciæ and the peritoneum in the subperitoneal tissue.



Fig. 8.—(Ranney.) Diagram of the fascia of the pelvic floor in a mesial section. It illustrates the levator ani fascia superior and inferior above and below the levator ani muscle. T, L, triangular ligament; P, F, two layers of superficial perineal fascia. Observe that in the anterior triangular perineal space there are five layers of fasciæ, viz.: 1, superficial layer of perineal fascia; 2, deep layer of superficial perineal fascia; 3, triangular ligament, outer layer; 4, triangular ligament, inner layer; 5, levator ani fascia superior. In the posterior perineal space there are two layers of fascia—the levator ani fascia superior and the levator ani fascia inferior.

The obturator internus fascia surrounds the obturator muscle at its origin, from the lateral pelvic surface of the innominate bone, and is the special fascia of the obturator internus muscle. It is attached for a considerable distance to the iliac portions of the

brim. At this point the obturator becomes attached to the upper border of the obturator membrane. In front, the attached line of the fascia passes below the ileopectineal line to allow the obturator vessels and the nerve to enter the obturator foramen or canal. This portion is fixed to the periosteum and appears as an independent organ. In front it is attached to the body of the pubis and along the upper margin of the obturator foramen by an oblique line, to a point about one-half an inch below the symphysis. Where the fascia dips under to allow the passage of the obturator vessels and nerves it is firmly attached to the periosteum and nerves by strong tendinous fibers. Posteriorly, it is attached to the anterior surface of the great sacrosciatic ligament and the anterior margin of the great sacrosciatic notch. Inferiorly, the fascia is attached to the margin of the obturator foramen of the descending ramus of the pubis, and it joins the falciform process of the great sacrosciatic ligament, which firmly connects it to the inner border of the ischium and its ascending ramus.

With a firm insertion in the ileopectineal line, the anterior border of the great sacrosciatic foramen, the anterior and inferior margin of the obturator foramen and to the edge of the falciform process of the great sacrosciatic ligament, the obturator fascia becomes a fixed, strong, thick, fibrous membrane, in relation superiorly with the obturator nerve and vessels and inferiorly with the internal pudic vessels and nerves—Alcock's canal. It has intimate attachments to the obturator internus muscle above, but is quite loose below.

The obturator fascia we divide into two portions, superior and inferior. The obturator fascia superior is that portion above the white line or arcus tendineus. It looks into the pelvic cavity from the lateral aspect and is covered by peritoneum. The peritoneum and

obturator fascia superior are separated by considerable loose, fatless, snow-white connective tissue, composed of many shiny, thin, cleavable planes, which become easily dissected by the progress of pelvic abscesses.

The structures of importance which pass over the internal face of the obturator fascia superior just below the ileopectineal line are the obturator vessels and nerves. These structures are liable to be injured by the head soon after its engagement by the brim or fixed bony ring of the pelvis. The obturator fascia superior has a surface of about ten square inches.

The obturator fascia inferior is that portion below the arcus tendineus or white line. It looks internally into the ischiorectal fossa and externally toward the obturator internus muscle. It forms the external boundary of the ischiorectal fossa. At the lower part of the ischiorectal fossa about an inch above the tuberosity of the ischium the obturator fascia planes become separated, producing a sheath — Alcock's Canal — for the transmission of the pubic vessels and nerves. The obturator fascia inferior has a surface of some five square inches, one-half the size of the obturator fascia superior.

At the lesser sciatic notch the obturator fascia passes out of the pelvis with the muscles and gains the postero-femoral regions of the thigh. The obturator fascia is inserted into the ramus of the ischium and pubis, where it passes on and blends with the triangular ligament of the urethra, hence the triangular ligament is a continuation of the obturator fascia from each side.

The arcus tendineus or white line appears as an aggregation of tendinous fibers of the obturator fascia. It extends from the posterior surface of the pubis to the spine of the ischium. It possesses a gentle curve with its concavity upward. The white

line gives origin to that part of the levator ani muscle which arises between the lower posterior surface of the pubis and ischial spine. The white line arises out of the ligaments of the bladder; a thickened portion of the obturator fascia is the line of origin of two planes of fasciæ. The upper plane I call the levator ani fascia superior, and the lower plane the levator ani fascia inferior. The white line varies in thickness in individuals—generally is one-sixth of an inch in thickness in the middle, but its greatest strength and width is at the anterior end, where it assumes intimate relations with the pubovesical ligaments. In women the white line is about four inches long. Its origin at the pubis may be chiefly from the anterior and lateral (true) ligaments of the bladder. The white line allows considerable elasticity. It is quite firmly fixed at the anterior end, and definitely at the posterior end, but, like a long, tight rope, allows considerable range of motion and sagging in the middle.

The levator ani fascia superior (rectovesical fascia of Tyrell, rectovesical aponeurosis of Carcassone or visceral layer of the pelvic fascia) arises from the white line and passing inward forms the floor of the pelvis. The levator ani fascia superior, as its name implies, covers the superior surface of the levator ani muscle. The fascia finally loses itself in the median raphe behind the rectum in the rectal, vaginal and vesical walls, and in the anterior and lateral ligaments of the bladder. From this relation, the levator ani fascia superior becomes of significant interest in perineorrhaphy. Anteriorly it is remarkably strong and short, being attached to the back of the pubis above the obturator fascia, from which it is separated by the origin of the levator ani muscle; the levator ani fascia superior, the levator ani muscle and the obturator fascia being all three closely adherent to the pubic bone and to each other.

If one carefully removes the peritoneum and loose subperitoneal tissue the levator ani fascia superior may be plainly seen stretching from the white line to the bladder, vagina and rectum. It may be stripped off the levator ani muscle in several thin, cleavable planes. It is reflected on the bladder forming the anterior true and lateral true ligament of the bladder, however the lateral ligaments of the bladder may be assisted by ligaments from the vagina. The levator ani fascia superior begins its anterior attachments at the lower border of the symphysis, continues then along the white line laterally to the ischial spine, continues from the ischial spine on the superior surface of the levator ani muscle to the median raphe. The levator ani fascia superior covers an area of about six square inches on each side of the median line of the pelvis.

The levator ani fascia superior may be divided into the anterior or vesical portion, the vaginal portion and the rectal portion.

The vesical portion of the levator ani fascia superior is reflected from the pubis to the neck of the bladder, forming the anterior true ligaments of the bladder and part of the lateral ligaments. The vesical portion is very thick and strong, even tendinous. It is reflected from the pubis in an arched manner. The vaginal portion of the levator ani fascia superior is analogous to that which surrounds the prostate in the male. In the male, the prostate gland and vesiculæ seminales are surrounded by a strong capsule derived from levator ani fascia superior. This portion of fascia surrounds the vagina in the female, including the large venous plexuses.

The vaginal portion is endowed with considerable strength and it becomes blended with and is lost on the vaginal wall. The rectal portion of the levator ani fascia superior passes to the rectal wall, becom-

ing continuous with the fibers and blending with it. There is a strong fillet passing between the rectal and vaginal canal. The part of this fascia which passes to the rectal wall, has been termed the ligament of the rectum. This fascia forms a strong support to the muscular wall of the rectum.

It is not an argument very rich in facts to say that the perineal body is to fill in the space in that region. It serves as an attachment for one end of the levator ani muscle. A subject which I have not found mentioned in the books is that in many parts the fascia of the pelvis consists of many distinctly defined layers, which can be cleaved from each other. For example, the fascia over the coccygeal muscle may be cleaved off in several layers, and the same may be said,—but not to such a degree—of the levator ani superior. Several thin, transparent planes of fascia may be cleaved off of the obturator fascia superior. Even the levator ani fascia inferior, which is very thin and compact, may be cleaved into two or more planes. The obturator fascia inferior is a very powerful fibrous plane of fascia and may be cleaved on each side into thin planes but the central plane is a thick, powerful, individual, somewhat coarse, fibrous membrane. The powerful obturator fascia inferior is cleaved, split, for the transmission of the pubic vessels and nerve. The canal formed by the separation is known as Alcock's canal. The several membranous planes of some of the fascia in the pelvis endow it with much more utility. One plane may tear without the other. Several cleavage planes are characteristic of fascia in other localities and are more capable of resisting trauma than a single plane.

The coccygeal muscle arises from the spine of the ischium and lesser sacrosciatic ligament, becoming inserted into the side of the coccyx and two lower sacral vertebræ. It is a flat musculo-tendinous tri-

angular plane, aiding to close the posterior pelvic outlet. Its anterior border is in contact with the posterior border of the levator ani muscle, of which it is practically a continuation backward and covered by the same fascia, viz., the levator ani fascia superior. The posterior border bounds the anterior margin of the great sacrosciatic foramen. The lesser sacrosciatic ligament, which is formed by a degeneration of the superficial muscular fibers of the coccygeus, takes the place of the continuation of the levator ani fascia inferior. The coccygeus muscle is fading out of existence, belonging originally to a large tailed animal. The origin and insertion of the coccygeus muscle and lesser sacrosciatic ligament are identical. They are so strong that practically they never yield so as to be involved in colpoperineorrhaphy. However, the coccygeus muscle is described in order to show that its fascia should be named the coccygeal fascia, which can not admit of confusion. The inferior surface of the coccygeus muscle is doubly strengthened, not only by the lesser sacrosciatic ligament, but by the superior surface of the great sciatic ligament which represents the proximal tendon of the long head of the bicep femoris. The tendon of the long head of the biceps formed an attachment at the tuberosity of the ischium. The coccygeus fascia covers the coccygeus muscle and has an area of about  $3\frac{1}{2}$  square inches on each side of the median line of the pelvis. The pyriformis muscle arises from the lateral portions of the second, third and fourth pieces of the sacrum, from the inferior border of the great sacrosciatic notch and from the great sacrosciatic ligament. It passes out of the pelvis through the great sacrosciatic foramen, becoming inserted into the upper border of the great trochanter. It is the most posterior muscle which aids in closing the pelvic outlet. It serves as a bed on which the sacral nerves



may rest. It is covered by the pyriformis fascia, which is a continuation of the obturator fascia above and the coccygeus fascia anteriorly. After leaving the obturator and coccygeus fascia it rapidly thins out into a transparent thin membrane. It is perforated by the internal iliac vessels which leave the pelvis by the great sciatic foramen. The pyriformis fascia is attached to the surface of the sacrum internal to the origin of the pyriformis muscle from the posterior border of the coccygeus muscle to the ileopectineal line which passes along the border of the wing of the sacrum to the sacro-iliac joint and finally it is attached to the superior margin of the great sacrosciatic foramen from the ischial spine to the sacro-iliac point. The pyriformis fascia covers an area of about five square inches on each side of the pelvis. The sacrum is lined by a thin fibrous membrane which we will name the sacral fascia; hence, the internal pelvis is lined by the obturator fascia superior, the levator ani fascia superior, the coccygeal fascia, the pyriformis fascia, and the sacral fascia. This nomenclature we recommend as simple, and as facilitating the easy acquisition of the internal fasciæ of the pelvis.

The use of the levator ani fascia superior is: *a*, to sustain the pelvic viscera, and is analagous to the fascia transversalis-abdominalis; *b*, to form a pouch on each side for the pelvic viscera, which assists in closing the pelvic outlet above the muscular floor; *c*, to fix the pelvic viscera; *d*, with its superior pad of fat and snow-white connective tissue, to support the pelvic peritoneum; *e*, to resist the pressure of the abdominal muscles and the diaphragm, and *f*, to serve the useful purpose of separating the perineal tissue from the peritoneum.

This latter anatomic condition limits inflammatory and infective processes from either perineal or peri-



perior and inferior limits nearly all fistulæ in and to one-half inch above the anus. A disadvantage of the levator ani fascia superior is that it is perforated by nerves and vessels which carry sheaths of connective tissue; these sheaths allow infective processes to pass from the perineal tissue to the subperitoneal tissue and vice versa. Deficiencies occur in the fascia, excavations which are filled with fat. The fascia of the pyriform muscles consists of an extension backward of the obturator superior and levator ani fascia superior. Both fascial planes blend, the one from the anterior margin of the sacrosciatic foramen and the other from the posterior margin of the coccygeus into a thin membrane which covers the pyriformis muscle and the sacral plexus of nerves. The pyriformis fascia is perforated by the gluteal vessels and nerves to gain the gluteal region. This plane of fascia is so thin and delicate that one can scarcely dissect it without tearing it. The levator ani fascia inferior (anal or ischiorectal fascia) lies in immediate and intimate contact with the inferior surface of the levator ani muscle. This fascia begins at the white line and becomes lost on the rectal wall. It is very intimately connected with the muscles. The levator ani fascia superior and inferior blend with the rectal wall about one-half to three-fourths inch above the anus, and rectal perforations generally occur below the insertions of the above fascia. The fibers of this fascia are included in all deep suturing of extensive colpoperineorrhaphy. By including its fibers in the sutures, the relations of the levator ani may be partially restored to the normal relations. The sacral and coccygeal fascia lines the anterior surface of the sacrum; it has localized thickenings and thinnings. The thickest portions are those located along the lateral margins of the sacrum and especially around the anterior sacral foramina. The triangular ligament

(deep perineal fascia) closes in the pelvic floor in front. It is the result of the union of the obturator fascia extending from both sides toward the center. It is a prolongation of the obturator fascia across the pubis, and Winslow called it the *ligamentum interosseum pubis*; Carcassone, the *ligamentum perineale*; Colles, the *ligamentum triangulare urethræ*. It is the deep blade of the fascia perinei and is an integral part of the obturator fascia. It is the middle fascia of the perineum, or Camper's ligament. It fills up the deficiency found between the anterior or pubic insertions of the levator ani muscle. It is a wonderfully powerful structure in fixing the lower end of the vagina. It is stronger in males than in females. It is the structure which retains, with powerful grip, the anterior end of the vagina forward and upward. The vagina pierces the triangular ligament whose fibers fix themselves in and around the vaginal walls. It joins posteriorly with the lower margin of the inferior edge of the superficial perineal fascia. If one dissects away all structure from the vagina except the triangular ligament it will become apparent at once what a powerful support it is to the lower end of the vagina. The triangular ligament, as its name implies, is triangular in shape, aponeurotic in structure, extending as a tense septum between the anterior part of the perineum and pelvis. It is attached on either side to the rami pubis and ischium. Its inferior or posterior margin is ill-defined, blends with the superficial perineal fascia at the ischioperineal fascia, where it gradually loses itself on the lower surface of the levator ani muscle. It sustains and fixes the urethral canal. It is pierced by the vagina at its base or weakest portion. It serves the useful purpose of connecting the bladder and vagina to the pubis, and of retaining adjacent organs in fixed relations. By its connection with the ischio-

perineal ligament (fascia) and levator ani muscle it serves to strengthen the inferior region of the pelvis posteriorly, and aids to fortify the rectum with its muscles. By dissection, it is plain to see how the triangular ligament closes the anterior perineal triangle, and the levator ani closes the posterior perineal triangle. The triangular ligament extends posteriorly on each side of the vagina and blends, not only with the lower ledge of the superficial perineal fascia, but very intimately interweaves and blends with the ischioperineal ligaments, making a powerful fixation for the vagina at its lower end. The triangular ligament in conjunction with the ischioperineal ligaments lends to the perineal body a "Punctum Mobile." In perineorrhaphy much attention should be given to the factor of including considerable parts of the triangular ligament and the ischioperineal ligaments in the deep suture, which secures a forward curve to the vagina, and also, by forcing medially adjacent tissues, it aids in producing the normal curve of the rectum backward. This ligament is a very important structure, serving many purposes of support, and aiding in repair. It is continuous with the levator ani fascia inferior, and above it is the levator ani fascia superior. The superficial layer of the deep perineal fascia of Colles is a strong fibrous membrane. It extends from one ischiopubic ramus to the other. This membrane blends posteriorly with the lower margin of the triangular ligament, producing partly ischioperineal ligaments. The superficial layer of the deep perineal ligament is less in extent in females than in men, on account of being pierced by the vagina. In perineorrhaphy it is of considerable aid in restoring the relation of the parts by allowing the deep sutures to draw the fascia medianward. The ischioperineal ligaments extend from the ischial tuberosities to the perineal body. They are strong

aponeurotic bands of a very resisting character. They result from the union of the lower border of the triangular ligament with the deep layer of the superficial fascia. The fibers of these ligaments play an important rôle in extensive colpoperineorrhaphy. These ligaments form a conspicuous structure in every dissection of the female perineum. In the advancing head the ischioperineal ligaments are put on the stretch and gradually forced backward. Should they rupture, by extensive flap-splitting and deep suturing the two layers of fascia which blend to make the ligament could be partially restored.

Having examined the structure of the pelvis in detail we may now combine the anatomic factors which explain successful colpoperineorrhaphy. The first is the restoration of damaged fascia. A second important factor is deep suturing. A third element in a successful operation is the restoration of function by means of restored muscular relations. A fourth is the forcing in the median line of adjacent perineal tissue, and a fifth factor is the flap method of operation whereby there is no denudation or loss of tissue, and the flaps (skin and mucosa) avoid infection and insure primary healing. The flap method enables the operator to reach the seat of the lesion, either by splitting tissue or deep suturing with a handled needle with an eye in the end. Silk-worm gut which is used in suturing, being non-septic, may remain for weeks in position, like a splint, before removing. Among the fasciæ of importance are: The levator ani superior and inferior, the triangular ligament and deep layer of the superficial fascia, and the ischio-perineal ligament. The operation of colpoperineorrhaphy is the result of evolutionary processes of failures and successes. In the beginning, it was considered sufficient to unite the superficial or external tissues at the site of the lesion. This experiment

soon demonstrated its own failure, and later it was deemed essential to restore the deranged and lacerated muscular elements in the pelvic floor. The attempt at successful colpoperineorrhaphy by reuniting external tissue at the site of the lesion or restoring deranged or lacerated muscles to normal relations proved a failure to such a degree that it was evident that some other factor played a rôle; this factor was the fascia. The restoration of the lacerated tissue at the site of the wound, with the deranged and ruptured muscles, and the restoration of the deranged fascia are the three factors on which successful colpoperineorrhaphy rests. To Dr. T. A. Emmet must be given the credit of the view that the pelvic fascia played an important rôle in successful colpoperineorrhaphy. Experimental labors on the perineum, in a desultory manner, have been carried on for fifty years. But only lately have experimental and anatomic data been judiciously combined so as to render clear what are the useful methods in colpoperineorrhaphy. All successful surgical procedures demand an anatomic basis. The deranged and lacerated parts in colpoperineorrhaphy must be restored in a manner similar to that in operation for hernia. The successful surgical procedures in colpoperineorrhaphy have passed through the same evolutionary process as have the various operations for hernia. In hernia we must restore the anatomic relations, the obliquity of the inguinal canal, so that its valve-like action makes it impossible for the viscera to again protrude. In colpoperineorrhaphy, not only the anatomic parts should be restored, but the various canals and outlets must also be restored, to ensure permanent success. Deep suturing, so essential, is only groping after an anatomic base to restore the ground work. The same ideas are involved in the views of discerning surgeons, who suggest that if the sutures include sufficient of



the rectovaginal septum, or if they are introduced deep enough to make forward traction, or if they include the sulcus on either side of the bulging vaginal wall, the operation will be successful. Dr. W. R. Wilson wrote a short but comprehensive article on the subject, suggesting excellent principles, but modestly claiming that the anatomic basis is still imperfectly understood. In the subject of colpo-perineorrhaphy the origin of the lesion demanding operation should be studied. The cause of the lesion, requiring repair, is almost always the result of (the first) labor, more rarely other forces produce sacropubic hernia. The lesions of the perineum may come from the forward movement of the head lacerating the levator ani fascia superior and inferior, with damage to the ischioperineal (ligament) fascia and tearing of the triangular ligament, with consequent inevitable lesion of the deep perineal fascia. This will destroy the tone of the posterior vaginal wall, because the fascia has been separated from the vaginal wall near its outlet. If the distinct ischioperineal (ligament) fascia be torn, which is quite frequent in labor, the vulvar end of the vagina falls backward and begins its condition of rectocele; its fascial (and doubtless muscular) supports have been torn away. With a torn levator ani fascia superior the pelvic viscera will inevitably descend, for it is unphysiologic for a muscle to act as a continuous, tensionized support for viscera. But it must be remembered that the fascial layers of the pelvis are not only of value as visceral supports by separate and distinct connection in themselves, but they are of significant importance as serving a means of visceral support and for a point of attachment for muscles lying between their blades. The levator ani, which is the most important muscular apparatus on the pelvic floor, serves by its fascial attachments as a visceral support to the rectal and



vaginal walls as well as to the pelvic floor, for the uterus is supported by the intact pelvic floor.

The pelvic floor may be considered as composed of two widely overlapping valves (Hart). Whatever disturbs the relations of these valves tends toward sacro-pubic hernia. The anterior pelvic valve is composed of the bladder, urethra, anterior vaginal wall and retro-pubic fat. The posterior pelvic valve is composed of the posterior vaginal wall, perineum and rectal wall. The pubic segment is attached to the symphysis pubis and composed of loose connective tissue. The retro-pubic fat is loose and spongy, the peritoneum may be easily stripped away from the bladder, and the bladder from the vagina. In labor, this segment becomes elevated and is the one which easily becomes deranged, or acquires pathologic conditions and especially is liable to prolapse or sacro-pubic hernia. The levator ani fascia superior becomes torn away from the walls of the bladder and vagina, allowing the intra-abdominal pressure to force the bladder and vagina downward.

When the uterus prolapses (sacro-pubic hernia) the anterior vaginal wall appears at the vulva first. The strong levator ani fascia has been torn from its walls and when the same fascia has been extensively torn from the bladder it prolapses also. In vesical prolapse the peritoneum with its many cleavable planes of subperitoneal (fascia) tissue becomes torn from the bladder. The sacral valve of the pelvic floor, consisting of the posterior vaginal wall, the perineum and rectum, is attached by strong fascial connections interwoven by muscles to the coccyx and sacrum. In labor, this segment is forced backward and straightened out. If it becomes defective by laceration at the perineal body the vagina loses its normal curve and sacro-pubic hernia is initiated, i. e., retroversion begins, which is the inevitable factor in sacro-pubic hernia. The uterus itself has nothing to

do with prolapses. Intra-abdominal pressure and defective sacral and pubic segments account for prolapse; the sacral segment is fixed; the pubic segment is movable.

The functions required of the pelvic floor are to resist intra-abdominal pressure and to allow rectal and vesical functions. The structural anatomy of the pelvic floor must not only be studied in general as to its segments, valves, muscles and fascia but each individual organ should be studied as regards its supports. The uterus has its individual supports, which, though not separate from the fascia and muscles, should be well considered, for colpoperineorrhaphy may be required for (prolapse) sacro-pubic hernia without visible lacerations. The first elemental individual supports of the uterus are the uterorectal (sacral) ligaments. They consist of two folds of peritoneum embracing muscular and connective tissue extending from the posterior surface of the cervix to the rectum (perhaps some fibers do extend to the sacral fascia). These ligaments are an extension of the muscular connective tissue fibers of the upper end of the vagina backward. As Dr. Frank Foster notes, the vagina and uterorectal ligaments form a balance beam on which the uterus rests. Yet it should be borne in mind that organs do not rest on bases, but are swung on supports or mesenteries. The brain, liver, heart and uterus are all suspended by supports and do not rest on other organs or bases. The uterorectal ligaments are powerful, peritoneal, muscular and connective bands which vigorously suspend the uterus by the neck. Careful dissections and vaginal hysterectomy will demonstrate that the uterus could not descend without the uterorectal ligaments became elongated.

These ligaments are a part of the musculo-fascial support of the pelvic viscera. The vaginal tube sup-

ports the uterus by being well embraced by the levator ani fascia superior and the levator ani muscle, and also by being well padded and surrounded by fascial planes of connective tissue fixed in its walls and adjacent structures. Fat pads and acts as a support by stiffening folds.

In colpoperineorrhaphy, it is well to remember that we have a fixed pelvic segment and a movable or displaceable segment. It will aid in repair. The movable pelvic segment comprises the urethra, bladder and vaginal walls. This segment is bound together by peritoneum on a very mobile base and by a considerable mass of loose connective tissue.

This segment becomes displaced by labor, distended bladder, vagina or rectum. If its fascial connections become torn, sacropubic hernia is inevitable. The fascial connections are considerable above the vulva, consisting of the levator ani fasciæ superior and inferior and to some extent of the levator ani muscle. Sacropubic hernia, arising from lacerated fascia of the movable pelvic segment is recognized by the vagina and bladder bulging downward at the vulva and making the vulva appear as a waist with the puckering string gone. The worst and most damaging cases of laceration are those which begin from the inside and progress outward, i. e., the fascia begins to tear high up in the rectovaginal septum, on the sides of the bladder and vagina. These are the cases which present distressing symptoms; when standing are worse on account of disturbed circulation and are pronounced "prolapse" by the general physician. In such cases the anterior vaginal wall appears first at the vulva, then the cervix and finally the posterior vaginal wall. The bladder gradually sags downward and difficult urination is added to the already existing train of symptoms. In lacerations of the sacral segment of the pelvis the lesions are more visible. The

perineal body suffers especially. It straightens out the fixed sacral segment and retroversion and inevitable subsequent sacropubic hernia results. The visible laceration of the perineal body was originally considered the chief requisite for repair and also the type of colpoperineorrhaphy. But the study of the pelvic fascia shows why the operation failed or succeeded. Frequently it may be observed that the perineal body is visibly torn, but no evil consequences follow, because the fascia remains intact. The rectum belongs to the fixed segment. It does not prolapse, but its wall stretches, elongates. As the advancing head forces forward and tears the levator ani fascia superior and inferior as well as the ischioperineal ligaments, the levator ani muscle also becomes deranged but practically the restoration of the fascia restores the muscles. The muscular layers of the pelvic floor are two—superficial and deep connected—and blended at the perineal body both by the muscular and fascial relations. The deeper layer is the levator ani muscle which descends from the sides of the pelvis in the form of a boat or bowl to its attachments on the pelvic floor. The superficial layer consists of the transverse muscles of the perineum, which extend from the tuberosities to the center of the perineum and also the bulbo-cavernosus, which surrounds the vaginal outlet. All the muscles are related to fascia, as the levator ani inclosed in double blades of fascia, i. e., the levator ani fascia superior and inferior. The deep transverse muscles lie between the triangular ligament and Colles fascia. The bulbo-cavernosus and superficial transverse muscle lie between the two superficial perineal fasciæ. The ischioperineal fascia is but the thickening of the lower border of the triangular ligament and Colles fascia. The significant importance of the fascia of the pelvis becomes at once apparent, not only in maintaining the integrity of the

pelvic floor, but in all repair of the same. The pelvic fascia is the chief element in maintaining perineal muscular relations. The pelvic fascia may be divided into deep and superficial layers, according to the deep and superficial layers of muscles. The deep pelvic fascial layers are united to the more superficial pelvic fascial layers in the perineal raphe, holding the pelvic fascia as a unit. The superficial fascial layers of the pelvis are attached from the ischial tuberosities to the pubic rami and stretch across the anterior perineal triangle. They shut off the pelvic outlet except at the vulvar orifice. Fascia may be torn without its associated muscle being torn. In perineal laceration the muscles lying between the fascial layers may become separated as to loops or as to the attachments of one or both ends. Also the fascia of the levator ani muscle may be lacerated in different localities and this allows complete repair.

When the muscular layer between the fascial layers separates, the muscular fibers retract irregularly toward the proximal end, leaving gaps which are difficult to effectually repair. The rupture and retraction of the levator ani with its fascia makes the deep sulcus found on each side of the bulging rectocele, because the fibers of the levator ani retract laterally toward the pelvic walls. It is evident there is a deeper factor in perineal lesions than visible lacerations. The deficiency in perineal lesions is not in proportion to the apparent extent of the injury. Every physician has noticed multipara with considerable external laceration of the perineum, with apparently little discomfort, and with the pelvic organs but slightly disturbed, while in other cases, with slight apparent lesions, complaints are serious. I have seen extensive visible lacerations with almost no complaints and apparent health. Again, we may observe cases when the perineum does not appear

lacerated, but the prolapsed vagina, the bulging rectocele and vesicocele appear at the vulva in a remarkable degree. In fact, as Dr. Emmet remarks, it looks like a bag which has lost its puckering string. There is a different explanation for each of the above classes. In one, the pelvic fascia has suffered in the lesion, and in the other, only a few muscle loops and possibly the perineal body. When the lesion involves the pelvic fascia its consequent result is that the circulation is deranged seriously, because the vessels are held in definite relations by the fascial planes, hence the discomfort on standing and exercising is from congestion. Baker Brown simply united the torn tissue at the vaginal outlet. Seldom does this simple measure afford any real relief from perineal laceration, for subjects with such visible slight traces suffer but little. In general the operations for the relief of perineal laceration are a failure. If the rectovaginal septum (fascia and muscle) be not brought in the grasp of the deep sutures success will not be obtained even though the vulva be closed. The secret of Emmet's success lay in the denuding of the vaginal septum, i. e., utilizing the tissue posterior to the vaginal wall. In fact, if the levator ani fascia superior and inferior be not lacerated the subject suffers but little from the lesion, though the perineal body be torn through to the rectum. The levator ani fascia superior forming the gutter or sulcus on each side of the vagina is firmly blended with the vaginal canal as the same strong fascia in the male surrounds the prostate. In labor, in perineal laceration we should not merely look for lesions in the posterior commissure of the vulva, for that is done by the escaping head and shoulders, and is visible, but we should look for concealed lesions of the strong fascia, the sulcus on each side of the vagina. The most serious lesion of labor may occur without visible external injury. This

lesion is in general a separation of the fascia from the vaginal wall. If the fascia be torn from this, the posterior vaginal wall will not be drawn against the anterior and the canal will be filled within; it will be like an open collapsed bag. The fascia together with the muscles holds the vaginal and rectal canals in a closed condition, excluding air. The ballooning out of the vagina with but little injury to the perineal body is indicative of fascial lesions within the pelvic cavity along the vaginal canal. The vaginal rectocele is due to the drawing aside of the levator ani fascia superior and but little to the external laceration. The beginning of discomfort on assuming exercise is due to deranged pelvic circulation, to dilation and straightening out of veins, to non-uniform support of the blood-vessels and nerves by the proper connective tissue. The advancing head crowds the fascia forward, and if the labor is terminated without forceps, the rents begin chiefly in the rectovaginal septum. It is well to decide what and where the laceration is, so that tissues may not be either denuded or split unnecessarily, for it is not unfrequent to see tissues united which were never involved in the lesion. Perhaps sufficient has been demonstrated, anatomically and clinically, to show that the lesions of the perineum which disable and discomfort the patient are chiefly lacerations of the fascia and secondarily of the muscles. On this view we base our labors. If this be the case, we can easily see that Emmet secured success by denuding an elliptical area of the vaginal mucosa on each side in the vaginal sulci. The curve of the denuded area corresponds to the posterior curve of the rectovaginal septum, and is situated within the introitus. Now, by introducing deep antero-posterior sutures, the levator ani fascia superior and inferior may be reunited, restoring the curve of the posterior vaginal wall and the fascial

layers at the vulvar outlet. In reuniting the levator ani fascia superior and inferior the levator ani muscle becomes also reunited, but in an imperfect degree. The levator ani is closely embraced by its superior and inferior fascial planes, as from its origin, insertion and relation it depends on its closely associated fascia. The restoration of the function of the levator ani muscle must be accomplished through restoration of its intimate planes of fascia. If success depended on the muscle chiefly, it would be necessary in rectocele to reunite the separated levator ani loops anterior to the rectocele in the median line or raphe, so the symmetrical muscular action would be restored. It is true that to secure muscular action of the levator the loop must be so repaired that the fibers shall start to act approximately from the raphe on both sides, but this is accomplished by reuniting the levator ani fascia as near as possible in the median line, which brings the muscular loops with it. The levator ani fascia superior and inferior is really a sheath for the levator ani muscle to accomplish its functions. The sheath can not be torn without creating damage to the muscle. In rectocele, this fascia is so torn and stretched that the anterior wall of the rectum loses its muscular support and bulges forward. Whether the sutures be introduced antero-posteriorly or transversely, it matters but little, if they include in their grasp the levator ani fascia existing in the lateral sulci of the vagina, and whatever is done, to be successful, the rectovaginal septum, composed chiefly of fascia, must be restored to reproduce the normal curve of the posterior wall of the vagina. Mr. Lawson Tait's flap operation on the perineum accomplishes exactly what Emmet's operation in the lateral vaginal sulci does, with the exception of denudation. Both operations, when properly and successfully executed, result in the restoration of the continuity of the deep



and superficial fascial layers of the pelvic floor, with the establishment of partial or complete muscular function. The deep sutures reunite the structures (fascia and muscles) at or near their normal points of attachment. Anatomically then, the objects to be obtained in an operation for colpoperineorrhaphy are 1, the restoration of the levator ani fascia, superior and inferior; 2, the reunion of the fibers of the levator ani muscle so that it will functionate—both fascia and muscle must have relations at the perineal attachment; 3, the restoration of the transverse perinei muscles which draw the vagina lateralward, causing it to remain open; 4, the restoration of the ischioperineal ligaments in regard to the perineal body; 5, the posterior curve of the vagina must be reproduced by restoring the rectovaginal septum; 6, a new perineal body should be restored so that the natural backward curve of the rectum and forward curve of the vagina should persist; i. e., normal relations should be established between the perineal center or body, on the one hand, and fascia and muscle on the other. The perineal body—"punctum fixum"—of vulvar surface relations should be restored.

The pelvic floor is composed of muscles, fasciæ, areolar and elastic tissue. These structures are interwoven into distinct though complicated relations and fill the gap of the pelvic outlet. The pelvic floor is composed of two halves, whose structures arise from the lateral walls and join in the medium line. There are two muscles, two fasciæ and two ligaments of each kind. If one will carefully study in dissection the levator ani and the bulbo-cavernosus muscle he will be impressed with their functional comparison. Both are sphincter muscles. Both have connection with skin as most true sphincter muscles possess. The three points of insertion of the bulbo-cavernosus may be considered as one muscle. They contract together.

and have a similar function. The common feature of the two muscles is their attachment to the terminal fibers of the rectum and vagina. The sphincter ani is closely united to the muscles of the pelvic floor by tendons and fascial attachments. The object of the muscles of the pelvic floor is to control the lower ends of the vagina and rectum. Fascial structures are common to muscles which have to afford sustaining power, as those of the abdomen, back and thigh.

#### GENERAL VIEWS.

As we employ perineorrhaphy to repair uterine prolapse (sacropubic hernia) as well as deficiency of the external sphincter apparatus, the subject covers a vast field. All kinds of genital supports—peritoneal, fascial and vaginal sphincter apparatus—must be considered. To have prolapse, both peritoneal and fascial supports must yield, as well as the occurrence of muscular relaxation. No one support to the exclusion of all others can be claimed for the uterus.

The utero-rectal (sacral) ligaments which consist of peritoneal duplicatures, containing fibro-muscular tissue, are very efficient uterine supports. The peritoneum itself, on account of its intimate connection to the pelvic viscera and fascia, doubtless gives considerable support.

The round ligament, with its peritoneal duplicature the broad ligaments holding some muscular fibers and the vesico-uterine ligaments all assist in supporting the genitals. In the consideration of sacropubic hernia, the intra-abdominal pressure, the state of the abdominal walls, as well as the visceral supports, should be weighed. Whether the patient has enteroptosis is a very significant question. The peritoneal duplicatures, with their contents, constituting mesenteries of the genitals, elongate in enteroptosis just as they do with the stomach, kidneys, intestines and

other viscera. It is not uncommon to find a uterus excessively mobile, due to relaxed supports. Displacements of the genitals not only involve their special supports and the pelvic floor, but the whole peritoneum and the abdominal walls.

It need not be doubted that the mechanism of the pelvic viscera is complicated. The levator ani, closely ensheathed in its superior and inferior fascia, forms a diaphragm through which the viscera find an outlet. By introducing the finger three-fourths of an inch

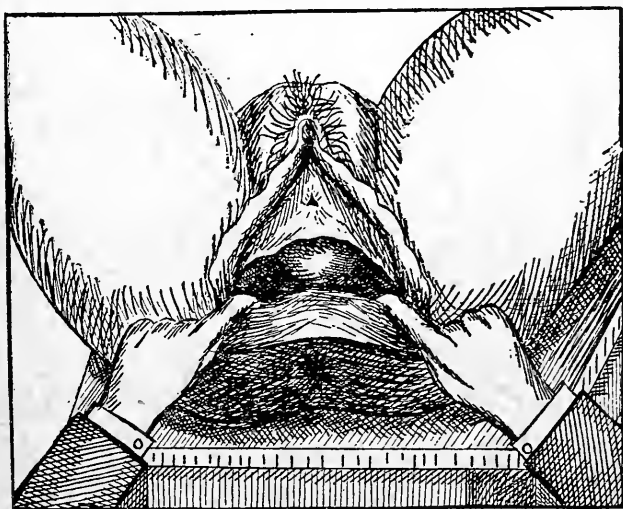


Fig. 10.—(Robinson-Scholer.) A medium degree of relaxed vaginal outlet, to be remedied by colpoperineorrhaphy.

into the vagina, the ledge made by the fascia and muscle enclosing the vagina can be distinctly felt. The muscle normally ensheathed in its scabbard, drives the vagina and rectum directly forward and upward toward the pubic arch. The fascia inserts itself into and embraces the lower third of the vagina and is the important support. The levator ani (fascial and muscular) supports lend to the lower third of the vagina a firm fixation, quite immovable,

forcing its walls closely in contact for about an inch, producing a pronounced vaginal sphincter apparatus. In marked contrast to the lower third of the vagina is the upper portion, which is lax, mobile and yielding, being surrounded by loose connective tissue only. The urethral portion of the vagina and the neck of the bladder are firmly fixed by the vesicopubic ligaments which dwindle off into the white line. This can be seen during respiration with highly relaxed and displaced genitals; the urethro-vaginal portion remains still, while the remainder of the organs move to and fro with each breath or diaphragmatic movement. Superiorly the lower vagina is extremely firmly fixed by the three layers of firm, fibrous fascia—the posterior layer of the triangular ligament, the anterior layer of the triangular ligament, and the deep layer of the superficial fascia. These three powerful and dense fibrous layers originate at the margins of the ischiopubic rami and stretch across the arch of the pubis, surrounding the vagina and being intimately blended in the vaginal walls. To be convinced of the fact that these fibrous laminae are the all-important supporting structures that not only retain the lower end of the vagina in position but prevent it from being torn away at labor, one needs only to dissect away all supports from the lower vagina except them, and then by tugging and dragging on the inlet of the vagina, note their almost unyielding qualities. Parts of these fibrous layers (triangular ligament) are frequently lacerated in labor, and must be included in the flap-splitting and deep sutures to restore the lower vaginal tube.

Laterally, the vagina is firmly fixed against the descending rami of the pubes, not only by the so-called triangular ligament, but by the levator ani fascia superior and inferior enclosing the levator ani muscle. By introducing the finger for about an inch

into the vagina and palpating the posterior and lateral parts, one can feel a blunt band running from the pubic ramus on each side downward and uniting behind the vagina in a still thicker and more blunt band. This is the free edge of the levator ani and its double fascia, where they come in contact and embrace the vagina. The vaginal canal, below the free edge of the levator ani and its fasciæ, is directed forward by the perineal body and triangular ligament while the same body directs the rectal canal backward.

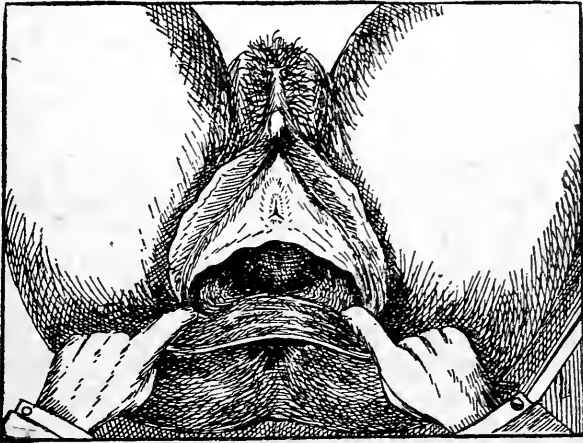


Fig. 11.—Robinson-Scholer.) A high degree of relaxed vaginal outlet, to be remedied by colpoperineorrhaphy.

The lower third end of the vagina is quite thick, very vascular, possesses turgidity and is surrounded by some circular fibers. In short, the lower third of the vagina possesses a distinct, vigorous sphincter apparatus which plays an important rôle in the support of the sexual organs and in perineorrhaphy.

In making a division of the supports of the pelvic viscera into those of the peritoneum and those of the sphincter apparatus, we may first make a few remarks on the deficiency of the peritoneal supports. The

utero-rectal (sacral) ligaments (extending from the rectum to the neck of the uterus) are the most important of the peritoneal supports. If they relax, the cervix will pass downward and forward, while the body and fundus of the uterus will pass backward. In other words, elongation of the sacrorectal ligaments is the initial stage of retroversion and descensus. Retroversion changes the intra-abdominal pressure from the posterior surface of the uterus to the anterior and superior. After retroversion the intra-abdominal pressure is exercised on the top and anterior surface of the uterus, driving the pointed neck, like a conical wedge downward at every breath. The cervix acts in retroversion as a wedge or cone, and gradually forces the sphincter apparatus to yield. The filling bladder forces the fundus backward and the full rectum pushes the cervix forward, all perfecting the retroversion, the beginning stage of prolapse, by elongating the utero-rectal ligaments.

In colpoperineorrhaphy, we must not only repair the deficient sphincter apparatus, but the cone-shaped descending cervix must be amputated and its blunt end turned downward, so that it should point and rest against the sacro-coccygeal region (bone and ligaments) instead of attempting to dilate the levator ani muscle at every breath by the change of intra-abdominal pressure. When the cervix once gets firmly into the vulva, i.e., into the vaginal sphincter apparatus, the descent is rapid and inevitable. The upper two-thirds of the vaginal walls being loose, easily descend with the uterus. In descensus uteri, the vagina is inverted, showing in all probability that intra-abdominal pressure had displaced the uterus first in the process of descent. An intact sphincter apparatus will long retard a descending uterus. The anterior vaginal wall appears first in prolapse; however the vesicopubic ligaments may still retain the bladder in posi-

tion. Posteriorly, the peritoneum descends with the cervix and upper portion of the vagina. In other words, the upper part of the rectum and vagina are separated, while the lower rectum and vagina are closely connected by a musculo-fascial septum, with the thin edge of the wedge upward.

Rare forms of prolapse may occur where the cervix is elongated or where the peritoneum is loosened and stretched. Space forbids reference to many other conditions and kinds of peritoneal supports.

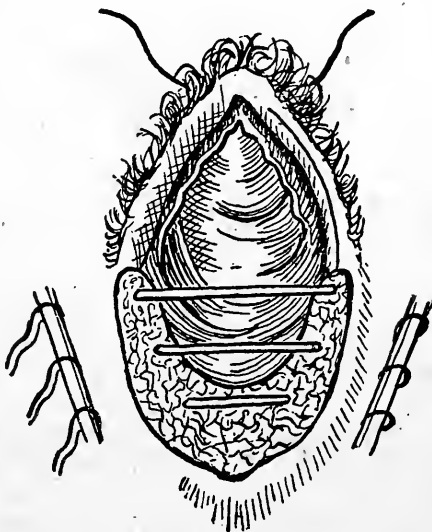


Fig. 12.—(After Hegar and Kaltensbach.) Baker Brown's method, about 1850.

#### GENERAL VIEWS IN THE DEFICIENCY OF THE SPHINCTER APPARATUS.

The vagina should engage more of our attention, because it is on this apparatus that the operation of colpoperineorrhaphy is applied. The primary factor which produces deficiency in the supports of the sphincter apparatus is labor. Other factors play but a secondary rôle.

The pelvic fascia is not infrequently lacerated near the ischiopubic rami; where the fascial sheath is ruptured the contained muscular fibers also suffer laceration. The results are cicatrices and loss of substance, which may be felt by palpation. The anterior vaginal wall generally escapes laceration, but the posterior vaginal wall is often damaged, showing various sized and formed lesions. Relaxation is prominent and closure incomplete. Instead of the curved lower canal with the perfect sphincter apparatus, there is a

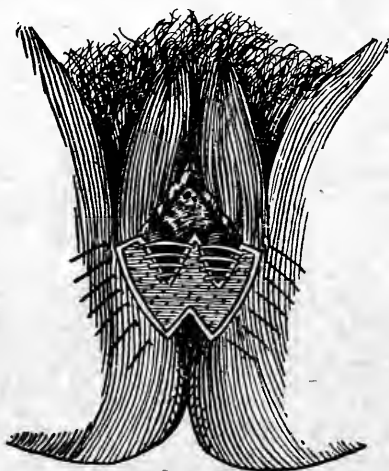


Fig. 13.—Dr. Goodell's method of colpoperineorrhaphy.

patulous, relaxed, open mouth, resembling a tobacco pouch which has lost its puckering string. Sometimes the vaginal mouth is closed by an anterior and posterior vaginal fold, for a considerable distance up the vagina. The causes of displacements of the sexual organs are so numerous—as elongation of the utero-rectal ligaments, elongation of the cervix, laceration of the levator ani fasciæ, muscles and triangular ligament, intra-abdominal pressure, enteroptosis—that all possible factors must be considered in repair. Repair must consist in correcting vicious forces, as the



pointed cervix should be amputated and turned backward, the posterior vaginal curve should be restored with a perineal body to turn the rectal end back and the lacerated levator ani fascia should be reunited.

An analysis should be made of the factors producing displacements and lacerations in the genital organs. Deficiencies of peritoneal support should be considered distinctly from deficiencies of the sphincter apparatus; however, both may be often combined. Yet, after all, our chief attention will be directed to deficiencies of the sphincter apparatus, for on it depends prolapse and lacerations, chiefly arising in it. Deficient primary peritoneal supports give rise to vaginal inversion as rectocele, vesicocoele, bladder and rectal disturbances, and the vaginal mouth loses its puckering string condition. In colpoperineorrhaphy, the whole of the tissue of the pelvic floor should be utilized for support by forcing it into the median line. This will restore the tonicity of the pelvic floor and form a firm cicatrix which will prevent sacro-pubic hernia and also reproduce the normal curves of the canals. To accomplish this, extensive denudations or flaps are requisite.

Successful colpoperineorrhaphy must make the pelvic floor as tense as possible and the newly formed cicatrix will aid materially in its success. The thickened tissue (columns) on the anterior and posterior vaginal walls are remnants of Miller's ducts, which should be and are preserved in both Dr. Emmet's and Mr. Tait's flap operations. They furnish evident support from their fibrous masses. It may be observed that nearly all successful methods of perineorrhaphy make the denudations in the vaginal sulci on each side, and avoid sacrificing the thickened tissue on the anterior and posterior vaginal walls. Reference to the labors of Bischoff, Martin, Hegar, Kaltenback, Schatz, Emmet and others will show this to be correct. After

performing colporrhaphy posterior, Martin makes what may be called an extension of the perineum forward. This is an excellent method of restoring the anterior curve of the lower end of the vagina. Any surgical procedure, to be successful, must conform to the anatomic structures. The denudation of the lateral vaginal sulci or the flap operations conform to anatomic conditions, and so far have proved successful. The

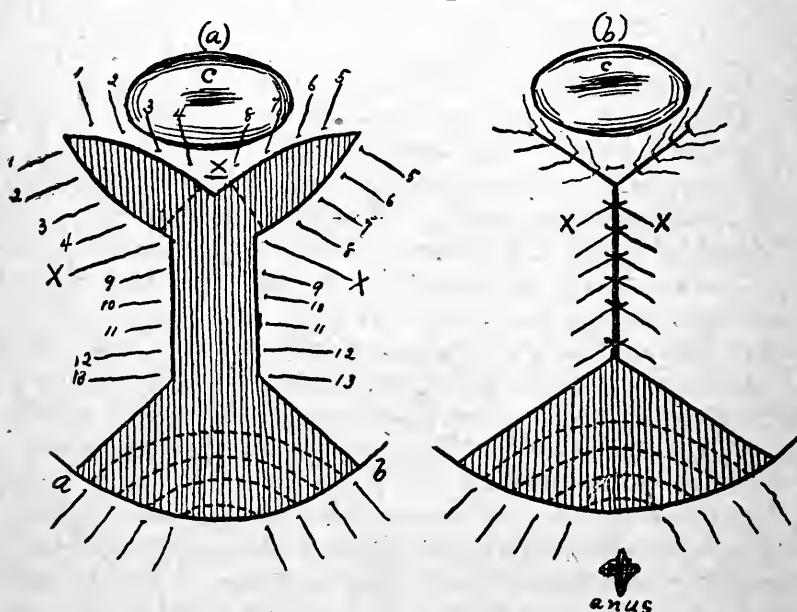


Fig. 14, a and b.—Dr. Reamy's method of colpoperineorrhaphy.

reason denudation in perineorrhaphy is so successful is because healing in the vagina occurs with considerable certainty.

#### THE METHODS OF PERFORMING PERINEORRHAPHY.

The methods of perineorrhaphy may be classified into three divisions, viz.: Those which start at the vulva (denudation); those which attack the lower vaginal portions (denudation); those which depend

on the flap procedure (which embraces colpoperineorrhaphy).

Numerous methods of perineorrhaphy have been tried since the days of Ambrose Paré, Dieffenbach and Baker Brown, when they simply united the superficial tissue which was situated on each side the visible laceration. This was a superficial vulvar procedure and was of small value except to prepare the way for more useful methods.

#### HISTORY.

If the ancients performed successful perineorrhaphy, I am unable to obtain the records. Colpoperineorrhaphy as a modern operation can scarcely boast of being more than a century old. Surgeons sought to prevent prolapse by excision of the vaginal wall so that the resulting inflammation would produce a contracting cicatrix. Others applied caustics for the same reasons. According to Schroeder, Girardin-Laugier employed the blue stone. Phillips used "smoking saltpetre;" so did Laugier, Velpeau, Kennedy, Dieffenbach, Colles and Simon. Chippendale sought to stir up inflammation and cicatricial contraction in the vagina by the very questionable method of infecting it with gonorrheal virus. Operators have attacked the vulva or vagina. The vulva was first attacked by such surgeons as Baker Brown and Paré. Fricke was the pioneer who performed episiorrhaphy which consisted of denudation of both labia and union by sutures. The failures of Fricke's episiorrhaphy induced later surgeons to operate higher up in the vagina, which finally resulted in the Emmet and Tait methods. Mende suggested denudation in the region of the hymen. Malgaigne thought it should be done deeper in the introitus. Jobert cauterized the vagina when it protruded, and after the exfoliation of the eschar, united the raw surfaces with

sutures. Desgranges employed chlorid of zinc to produce cicatricial contraction. Marshall Hall was among the first to employ elytrorrhaphy. He cut out oval or long segments of the vaginal mucosa and united the denuded surfaces with sutures. Dieffenbach formed flaps. Velpeau was one of the first surgeons to do successful perineorrhaphy. Langenbeck and Karl Braun were also pioneers in the operation. Early operators failed on account of lack of anatomic knowledge and prevailing sepsis. It is not many decades since surgeons learned the necessary anatomy to employ in colpoperineorrhaphy. It was learned that the perineum must not only be elongated, but a solid, thick, unyielding pelvic floor must be constructed that the sexual organs can not escape. Perhaps Simon, the predecessor of Czerny at Heidelberg, was the real founder of colpoperineorrhaphy. when, in 1867, he had not only performed but added to it that of posterior colporrhaphy. Simon freshened the vaginal wall with a scalpel, and a fenestrated speculum was placed in the vagina while he freshened the upper part of the vaginal wall by having an assistant introduce the finger in the rectum and force the vaginal mucosa out at the vulva. Veit, Hegar and Spiegelberg aided to develop the operation. As time passed, instruments for support were gradually displaced by more perfect operations, owing to more perfect anatomic and pathologic knowledge. Most of the advances are due chiefly to the investigations of Freund, Huguier, Martin, Schroeder, Wilms (1879) and Staude (1880), Breisky, Huepfel and others mentioned in this monograph. The practical execution of colpoperineorrhaphy by the celebrated Heidelberg surgeon, Simon, is the real foundation of subsequent labors. The success attending Simon's addition of colporrhaphy demonstrated that some form of vaginal operation is required in prolapse or deficiency of the

peritoneal or sphincter apparatus of the pelvic floor. Celsus, it is reported, recognized perineal lacerations and suggested rest in bed and tying the legs together, but gave no surgical views of repair. Ambrose Paré, a fertile genius, demonstrated the use of sutures before 1880. He had a pupil named Guillenneau, who restored the parts, applied the sutures and secured curves. Sancerotte and Noel secured success about 100 years ago. In 1829, Dieffenbach, surgeon to the Charity Hospital in Berlin, devised useful methods of repair. The deductions which made Dieffenbach celebrated in perineorrhaphy were his methods of lateral incisions (to relieve tension) and confining the bowels by the aid of opium. Chelius opposed this view, insisting that the bowels should be loose. In 1852 Von Langenbeck gave to the world his views through a memoir written by Verhaeghe of Ostend. This definitely advocates the use of the flap and splitting of the rectovaginal septum. Marcy gives credit to Dr. Jenks for originating the flap. Zweifel gives Mr. Lawson Tait credit for the flap-splitting method, to which he is no doubt entitled. Hart and Barbour credit A. R. Simpson with it. Baker-Brown published in 1854 his first edition of the "Diseases of Woman," in which he advocated Dieffenbach's lateral incisions, the use of deep quilled sutures, confining the bowels with opium, and bilateral division of the sphincter. The perineal sutures were removed the third day, the remainder later, as late as twelve days. All sutures were silk. It appears that Dieffenbach and Baker-Brown realized that the denudation should be carried up into the posterior vaginal wall, the fact which Simon actually demonstrated. It is reported that Mettauer of Virginia in 1830 used lead sutures; other metallic sutures were also employed. In New York, in the Woman's Hospital, Drs. Sims, Emmet and Thomas further developed colpoperineorrhaphy.

At present the operation should be termed colpoperineorrhaphy. New aids have also been developed in regard to the operation, as A. Martin taught for years that one should begin the operation for colpoperineorrhaphy by setting up an involution of the uterus by amputating the cervix. I have amputated the pointed conical cervix to get rid of the dangerous dilating wedge to the sphincter apparatus of the pelvic floor, to prepare for successful colpoperineorrhaphy.

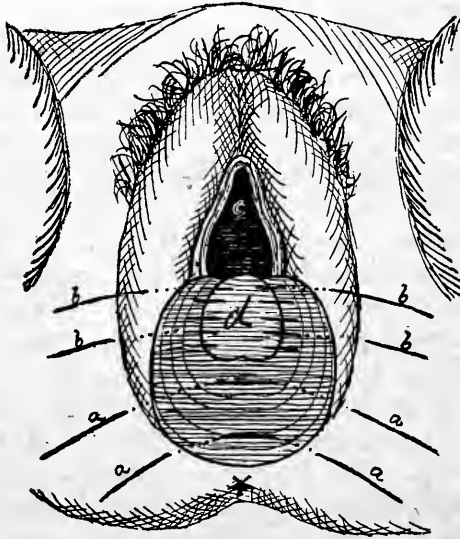


Fig. 15.—Colpoperineorrhaphy according to Bischoff. The tongue-shaped portion of the posterior wall of the vagina, d, is not dissected away. The denudation in this operation is severe and bleeding is active, and should the operation fail much damage is done. a, a, and b, b, show the method of introducing the sutures and the shape of the denuded area.

A new era appeared in this operation when the flap began to be formed. So far as records are accessible, the late Berlin surgeon, von Langenbeck, in 1852, first described the flap operation in perineorrhaphy. He describes the splitting of the rectovaginal septum making a vaginal flap forward and a rectal flap backward. Langenbeck's description of perineorrhaphy, as translated by Dr. Marcy, is the most important

contribution to the subject before the time of Simon of Heidelberg. In fact, it is almost equivalent to Simon's, and in one sense superior—in the use of the flap. Perineorrhaphy was also cultivated by Zary, Mursina, Mensel, Osiander, and Horner. Perineorrhaphy was first performed with silk sutures, the hot iron, and chemicals. About three-quarters of a century ago metallic (wire) sutures appeared. In 1879, Werth published views on the use of catgut (animal ligatures) for buried sutures. Schroeder chiefly introduced the buried spiral catgut sutures in perineorrhaphy. Silkworm gut is one of the best materials for sutures in general use at present. About 1872, Mr. Lawson Tait began the use of a certain flap method, consisting of resplitting the old cicatrix by the use of scissors, reuniting the produced wound surfaces by means of sutures which do not penetrate skin or mucous membrane. The utility of this consists in its application to either, or both, perineorrhaphy or colpoperineorrhaphy. The flap operation was dimly begun by Dieffenbach, in 1829, by his lateral incisions to relieve tension. The flap operation was definitely introduced in perineorrhaphy by von Langenbeck, about 1850 ("Memoire," 1852, by Verhaeghe). In 1861, Colles of Dublin, in a case of vesico-vaginal fistula, resplit, instead of paring the edges, and united the resultant flap. In 1872, John Duncan resplit the edges of an artificial anus and reunited them with interrupted catgut sutures. He forced the flap of mucosa upward and drew the flap composed of musculosa and serosa outward, thus increasing vastly the denuded surface for coaptation, Hart and Barbour report that Dr. A. R. Simpson applied this flap method to perineorrhaphy. Not far from 1872, Mr. Lawson Tait applied the flap operation of Langenbeck, Colles and Duncan to the subject of perineorrhaphy. He added to all previous labors the use of sharp-pointed

elbow scissors, and the introduction of the sutures without penetrating the skin or mucosa of vagina or rectum. Silkworm gut sutures are employed and may remain in situ for ten days to six weeks. According to Sanger, Stein, a Dane, and Voss, a Norwegian, used similar methods. Later, Hadra, 1887, contributed valuable views on the restoration of the pelvic floor, as well as Marcy, Jenks, Byford, and Reamy.

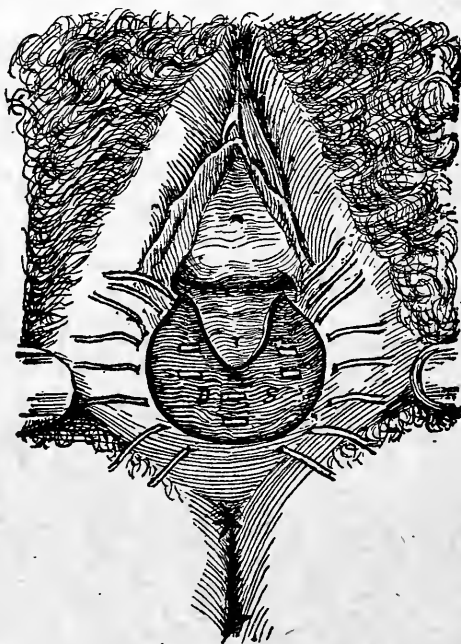


Fig. 16.—Dr. Skene's method. The area D. S. is denuded, with sutures in situ ready for tying. The method resembles that of Hegar and Staude.

The various so-called operations for (colpo) perineorrhaphy are numerous. The first operation devised involved the vulva, the second both vulva and vagina.

1. Ambrose Paré (1580) used simply sutures. His pupil Guillemeau practised and improved the method (1649). LaMotte, Smellie, Noel, Murena and Sancerotte practised it.



2. (1830) Dieffenbach, union by sutures, and tension relieved by lateral incisions. Roux (1834) introduced it into France, as well as Mark See (1885), and Polaillon (1885).

3. Baker Brown (1885, union by sutures of the denuded surfaces. Wilms and Staude cultivated it in Germany.

4. The next important contribution and method devised in perineorrhaphy was von Langenbeck's flap method (1850). It was described and performed with a master hand. Von Langenbeck also suggests that the lateral incisions of Dieffenbach may be added, as it obviates dragging from movements. He advocated operation immediately after the injury, if possible. Von Langenbeck makes several distinct steps in the operation: vivification of the free border of the recto-vaginal septum; the undoubling of the septum and the formation of the flap destined to form in the new perineum, the anterior side of the triangular space formed by two canals, vagina and rectum, with the perineum as the base; the vivification of the two lips of the laceration; the insertion of the sutures. In this operation of perineorrhaphy von Langenbeck started the flap method. The flap operation protects the wound from secretions (vaginal or rectal).

5. In 1867 Simon of Heidelberg began the real modern steps in successful perineorrhaphy, which was a combination of perineorrhaphy and posterior colporrhaphy. Simon simply improved on Baker-Brown's method by not only freshening the perineum; but also carrying the denudation high up into the vagina. Simon denuded the vagina by the aid of a fenestrated speculum. The upper angle of the vaginal wall was denuded by introducing the finger into the rectum. Spiegelberg and Veit aided in developing the subject. Englehart wrote in 1871; Banga in 1875 wrote a thesis on "Kolpo-perineorplastik" ac-

cording to Bischoff. In 1879 Hegar and Kaltenbach made excellent contributions. In 1877 Le Fort, and Neugebaum in 1881, added their labors. In 1877 Dr. Edward W. Jenks of Detroit began the publication of a series of articles on perineorrhaphy which was really a flap method of operating—a distant relative

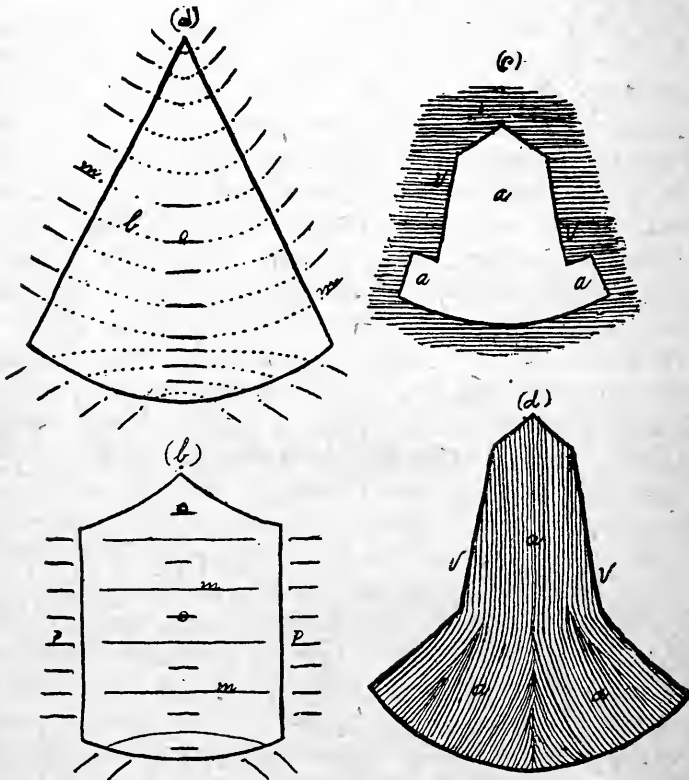


Fig. 17.—Shapes of the denuded areas in colpoperineorrhaphy; a, Hegar; b, Simon; c, Lossen; d, Fitch. In a, and b, the dotted line represent the sutures buried by tissue, the black lines the exposed sutures.

of von Langenbeck's procedure. Dr. Jenks first cut away the flap, but afterward preserved it. The method is almost precisely similar to the flap method attributed to Dr. A. R. Simpson by Hart and Barbour.

In 1879 Werth began to use buried catgut to suture the wound. Dr. Bröse, in 1883, used buried animal ligatures. H. O. Marcy published a series of articles (1883) on perineorrhaphy, advocating the flap method and buried animal ligatures, which he first used in hernia in 1881. A. Martin of Berlin contributed excellent labors about 1882. About 1880, Professor Schroeder of Berlin obtained excellent results by the use of the "étage" stitch, a continuous running suture of catgut buried in the tissues of the denuded surfaces. As a pupil of Schroeder and Martin, I observed excellent results from this method. Bischoff in part revives the flap operation of Langenbeck. However, his operation was quite influential in its day. Drs. Byford, father and son, made valuable contributions to the subject. History notes that Simpson carried Duncan's flap-splitting to the perineum. Simpson performed a kind of four-flap perineorrhaphy for many years. Perhaps Mr. Tait imbibed some of his views.

In 1887 Dr. Hadra of Texas contributed some valuable articles on the subject of perineorrhaphy. He suggested vivification of the posterior vaginal wall for colporrhaphy, as is done in anterior colporrhaphy. Since 1880, the laborers in the field are legion. Gradually the operation of perineorrhaphy was modified from Paré, Baker Brown, Dieffenbach, Langenbeck and Simon to Tait and Emmet. The modification consisted in denuding not only the perineal tears, but also denuding higher up in the posterior vaginal wall. Hildebrandt especially carried the denudation well up into the posterior vaginal wall.

As regards suture material, Sims, Thomas, Emmet and others worked out the application of metallic wire to plastic labors on the perineum during the past thirty years. The modern tendency is to use silkworm gut as a non-absorbable suture. This may be left

weeks in a wound, and acts as a splint in coapting the surfaces. It is easy to remove. To Dr. T. A. Emmet is due the credit of introducing a method of perineorrhaphy which, until recently, was the one generally practised in America. In 1883 Dr. Emmet published a new method, or rather a modification of his old operation. Dr. Emmet denudes the sulci on each side of the vagina and extends the perineum forward. His operation is intended to repair perineal fascia and muscles. Dr. Emmet holds that loss of support fol-

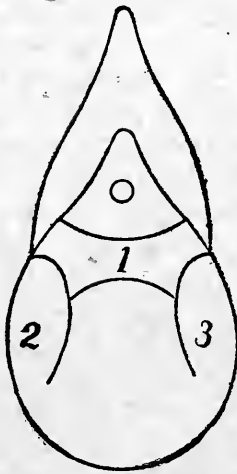


Fig. 18A.—Emmet's operation (elytrorrhaphy posterior) for prolapse: 1 and 2 show the lines of union of denuded surfaces in the vaginal sulci on each side of the vaginal column, 3, which still remains.

lowing laceration is not due to injury of the perineal body. The loss of support after childbirth, he claims, is due to rupture of perineal muscles and fascia. Dr. Emmet's operation is difficult to make clear by description, but it consists in lateral denudation wholly within the vagina to such an extent that when the sutures introduced are drawn tight, the excess or slack in the posterior vaginal wall disappears. The ostium vaginæ is not interfered with by any special denudation. The claim of his operation is that discomfort

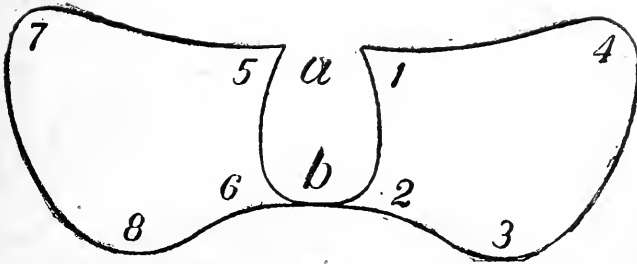


Fig. 18 B.—Staude's operation (elytrorrhaphy posterior) for prolapse; 1, 2, 3, 4, and 5, 6, 7, 8, represent the denuded vaginal sulci; *a*, *b*, shows the intact column, which is utilized in coaptation and fixation of the denuded surfaces. The principle of saving and utilizing the column is the same as in Martin's and Emmet's operation.

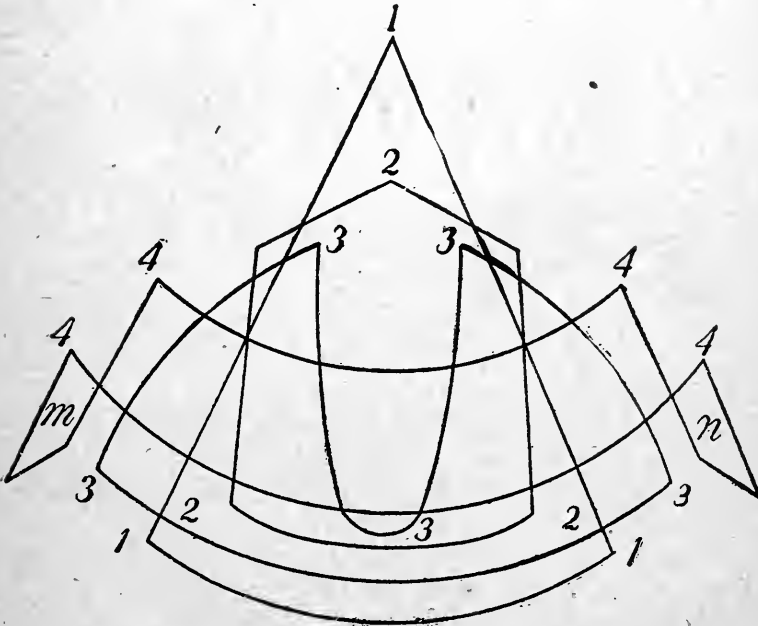


Fig. 18 C.—Various shapes of the denudation in posterior elytrorrhaphy, represented by superimposed diagrams: 1, 1, 1, Hegar's; 2, 2, 2, Simon's; 3, 3, 3, Bischoff's; 4, 4, 4 *m*, *n*, Winckel's. Observe that Bischoff saves the column.

disappears immediately after, and also that the posterior vaginal wall is brought in proper position and relation to the anterior wall, as it is in the normal condition. The view maintained in this surgical procedure is that the perineal body is insignificant in support, and that laceration of it alone impairs but little the integrity of the genital supports. But the tearing or excessive stretching of the perineal muscles and fascia at their attachments to the genitals quickly disturbs the delicate balance of the pelvic organs.

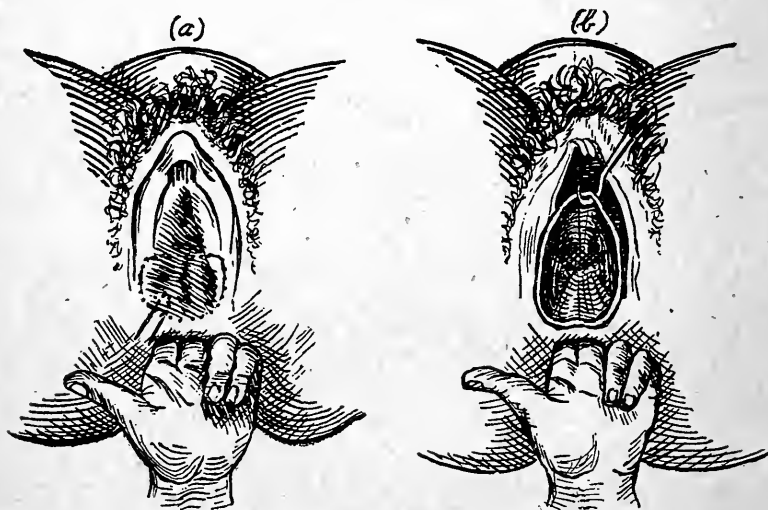


Fig. 19 *a* and *b*.—Dr. Jenks' method (flap) of perineorrhaphy. The flap-splitting is executed with two fingers in the rectum, and a scalpel. In *a* the flap is marked out by a dotted line; in *b* the flap is completed, ready for suturing.

There is one point against Dr. Emmet's operation, and that is the relatively blind method of introducing the higher sutures. In other words, the deep layers of the lacerated pelvic fascia may not be included in the sutures with any degree of certainty. Dr. Gill. Wylie added the idea that Dr. Emmet's operation would be improved by denuding the posterior vaginal wall a considerable distance and then continuing the denu-

dation well up into the posterior vaginal sulci. This method, however, sacrifices a larger amount of posterior vaginal wall.

About 1872 Mr. Lawson Tait of Birmingham, England, began to introduce a method of perineorrhaphy known as the flap method. It differed from all others in that he used elbow scissors and introduced the very deep sutures without penetrating the skin or mucous membrane. It involved no loss of tissue. The direction for doing the Tait operation is to resplit the old cicatrix. It is modified according to the condition of the case, as one may produce anterior and posterior cuts. Tait's flap perineorrhaphy is now quite generally practised. I have not attempted to give all known historic methods of perineorrhaphy, but simply the chief ones, out of which have been built the modern operation.

#### GENERAL INDICATIONS FOR PERINEORRHAPHY.

1. To restore rectal and vaginal functions.
2. To restore pelvic fasciæ and muscles. Normal fascia is required for normal circulation.
3. To restore the normal relation and support of the posterior wall (colporrhaphy posterior). The posterior vaginal wall sustains the anterior vaginal wall and bladder.
4. To provide as much support for the pelvic organs as the restoration of the perineal body will afford.
5. To remove the neurasthenic conditions; to relieve the innumerable nervous associations; in short, to relieve mental and physical disturbances.
6. To repair and check sacropubic hernia.
7. To narrow relaxed pelvic outlet.

The pelvic floor is closed from behind forward by the pyriformis with its thin, delicate fascia, the firm sacrorectal ligaments, the coccygeus with its moder-

ately strong fascia, the levator ani muscle with its levator ani fascia superior and inferior, a strong double fibrous protective muscular sheath, and also the triangular ligament, a powerful layer of fibrous tissue. The coccygeus with its fascia, the levator ani with its double fascia and the triangular ligament practically constitute the pelvic floor and seem to separate the pelvic cavity from the perineum. These are essential structures in colpoperineorrhaphy. The

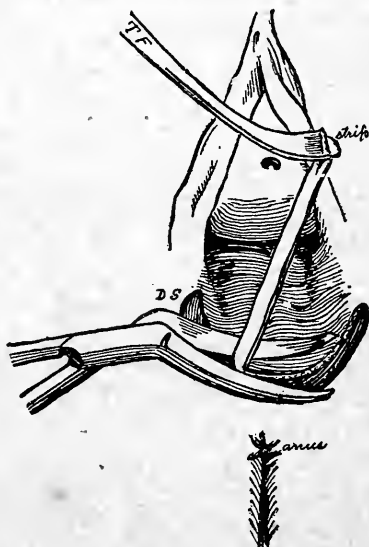


Fig. 20.—Method of denudation of vaginal strips, with curved scissors, from one side of the vagina to the other, as suggested by Dr. Skene.

levator ani fascia (both layers) pass from the side of the pelvis to the viscera, firmly attaching themselves to every pelvic organ, forming the strong, fibrous expansions known as ligaments, which serve to hold the pelvic viscera in definite fixed relations. In perineorrhaphy, success depends on the restoration of these vital supports; a significant anatomic fact in pelvic pathology is that the blood-vessels lie superior to the pelvic fascia and the nerves inferior to it. The



blood-vessels which arrive in the perineal region pierce the pelvic fascia and pass chiefly out of the great sacrosciatic notch.

The levator ani fascia, superior and inferior, is an important structure to limit infection. It separates the ischiorectal fossa from the pelvic cavity proper where so much loose tissue exists. The levator ani fascia is pierced by vessels and nerves, and these vessels and nerves are surrounded by lymphatic sheaths which are a source or path by which the infection may travel from the pelvis to the ischiorectal fossa, and vice versa. In perineorrhaphy the levator ani fascia, superior and inferior, is incised. The operation which is performed for the restoration of the perineum exists under different names. It may be termed perineorrhaphy, perineo-vaginal restoration, perineal extension, perineauxesis, or the flap method. However, I think the best name is colpoperineorrhaphy. Colpoperineorrhaphy is an operation to restore the integrity of the supports of the sexual organs. These supports include those of the peritoneum and vaginal sphincter apparatus.

The perineal body is situated between the lower end of the vagina and the rectum. Difference of opinion still prevails as to the utility of the perineal body in the economy of the female genitals, but, from many dissections and considerable work on the subject, I claim the following functions for the perineal body:

1. It sustains the lower ends of the anterior rectal wall and posterior vaginal wall.
2. It supports and directs the discharging end of the vagina forward, aided by the triangular ligaments and levator ani.
3. It supports and directs the discharging end of the rectum backward; the rectum is directed backward by the levator ani muscle.

4. It not only keeps the discharging ends of the rectum and vagina widely apart, but it gives both a support in a curved direction at their termination, thus affording mechanical advantages for maintaining closure of both apertures and preventing the easy escape of the contents of either canal. The wide divergence of the two canals avoids mingling of the secretions and consequent irritation from decomposition. The backward hook of the rectum and the forward hook of the vagina are an important factor in support, and

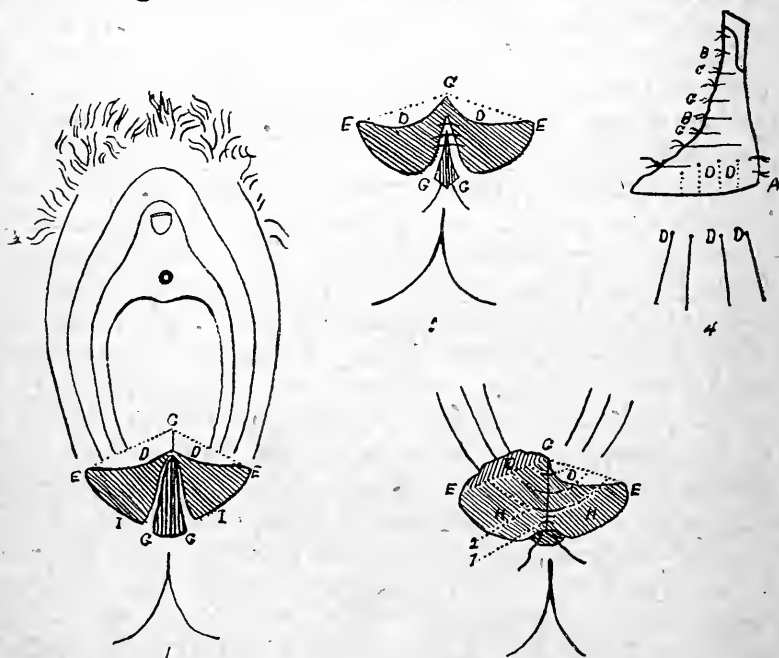


Fig. 21.—(After Pozzi.) LeFort's (1889) method, which is similar to Demarquay's (1864-1875) and Richert's. An incision is made in the vagina at the point C, in the median line down to the rectum; then an incision is made along the line C, D, E; another line, C, G, is carried along the rectal wall, but not into the rectal mucosa; another line joins it by means of E, I, G; this makes a distinct triangle, H (seen in No. 3); the cicatricial tissue is removed from the triangle, H, and also the portion of the vaginal wall, marked D, is seized and dissected from the rectal; the space denuded is D and H (No. 3); the sutures are introduced as shown in Nos. 2 and 3. The disposition of the sutures is noted in No. 4. The operation is a partial flap method, but too complicated for ordinary practice.

prevents gaping. The perineum is the skin between anus and vagina. The perineal body consists of skin, fat, muscles, fascia, elastic and connective tissue. The perineal body as a support in itself for the genital organs has been much overestimated.

5. It serves as the point of union of four muscles: the levator ani, the sphincter ani, the bulbo-cavernosus, and the transversus perinei. It serves also as a point of union of the various fasciæ.

6. It acts as a partial support of the pelvic floor.

7. It strengthens a tried point in labor.

8. Laceration of the perineum to any considerable extent destroys the nice balance between anatomic structure and physiologic function in the female genitals.

The object of perineorrhaphy is: To restore partial ruptures; to restore rectal functions after complete ruptures; to prevent prolapse of the pubic segment of the pelvic floor.

The methods of performing perineorrhaphy are denudation with fixed coaptation, and the flap method. The etiologic factors of lacerations are labor, coitus and trauma. Partial laceration of the perineum may be accompanied by vulvar patency; increased vaginal secretion; irritability of parts; pathologic condition of nerve structure; neuralgic or neurotic conditions induced by long-continued local lesions; descent (distention) of anterior rectal wall, posterior vaginal wall, and uterus. Complete laceration of the perineum may be accompanied by vulvar and anal patency; increased vaginal and rectal secretion; incontinence of bowel contents and occasionally of bladder contents; irritability and disease of the surrounding parts from the abnormal secretions; neuralgic and neurosial conditions from changes in nerve structure; melancholia (neurasthenia); relaxation of the displaceable segment of the pelvic floor and consequent prolapse or hernia

of the pubic segment. The result may be severe congestion from a disturbance of the fascia which holds the blood-vessels in relation. If the blood-vessels become distorted in their bed, disturbed circulation results.

In discussing the operation for colpoperineorrhaphy by Emmet and Tait I shall consider these both founded on anatomic principles, both practical and successful operations, and both arriving at the same end by different methods. However, since I can accomplish by a flap method exactly what Dr. Emmet accomplishes by denudation I have preferred to follow the flap procedure. I have employed the flap method for over six years, comprising over one hundred operations performed for almost all kinds of perineal laceration and uterine prolapse. In one case the uterus was completely prolapsed for fourteen years. Another case of thirty-four years' standing, with laceration extending up the rectum the length of the index finger, was operated successfully after three previous denuding operations. A third case of twenty-eight years' standing, was lacerated up the rectum for four inches and had passed through three unsuccessful operations. One of twenty-seven years' standing, with three-inch rectal laceration, and one very difficult case of seven years' standing, with several unsuccessful operations by well-known gynecologists, were operated on with perfect success. In these cases of long standing, atrophy was so far advanced from limited blood-supply and non-use that it required extensive flaps in order to secure tissue for a perineal body. To show that the perineal body is not significant in uterine support, several of those patients continued for over twenty-seven years with laceration several inches up the rectum, with scarcely a symptom of uterine prolapse.

It will be observed from even a superficial experience that the patient should be properly prepared for colpoperineorrhaphy. If the patient have a

long, pointed cervix, which acts like a conic wedge being driven downward at every breath or increase of intra-abdominal pressure, it will constantly dilate the vaginal sphincter apparatus and should be amputated. The amputation may produce involution of

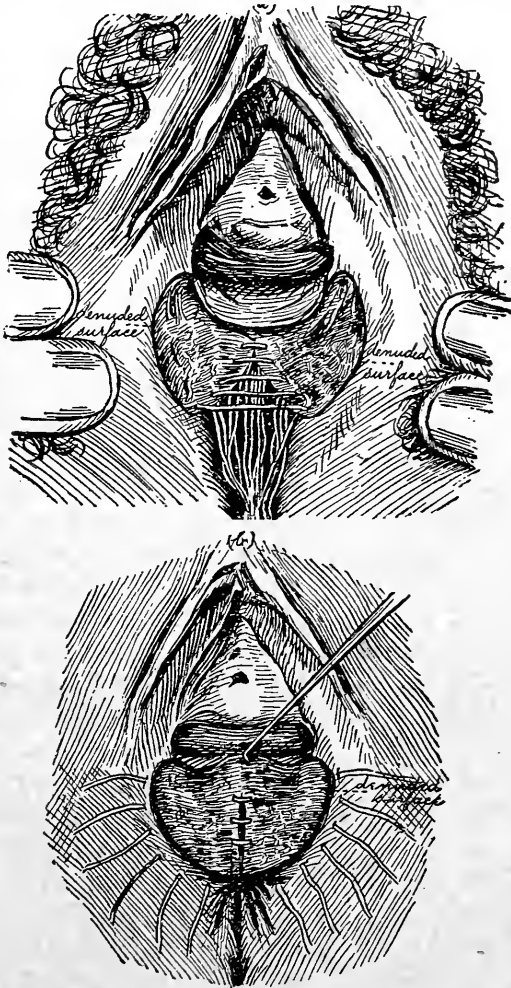


Fig. 22 a and b.—Dr. Skene's method of denudation and suturing the rectum.

the uterus. A long, pointed, conical cervix generally has behind it a retroverted uterus which precedes prolapse.

Again, if there is a cystocele the patient should be prepared by an anterior colporrhaphy. It may be that amputation of the cervix and anterior colporrhaphy can be done at the same sitting and anesthesia as the flap-splitting colpoperineorrhaphy. We frequently perform colporrhaphy and colpoperineorrhaphy at the same time. To require cervical amputation is rather rare, but if there be a retroverted uterus with pointed cervix it should be amputated and turned backward against the sacrum. In short we must imitate nature as much as possible to secure success. All hernia is the same; it is due to the destruction of normal valves and the straightening out of oblique canals. Hence in sacropubic hernia the normal obliquity of the vaginal canal must be restored. Colpoperineorrhaphy restores the posterior vaginal wall and anterior colporrhaphy restores the anterior vaginal wall. This is not often needed if the colpoperineorrhaphy be thoroughly performed. Prolapse is prevented by perineorrhaphy, elytrorrhaphy, episiorrhaphy (or some abdominal operation). Prolapse may be considered as a downward displacement of the pubic segment of the pelvic floor; the sacral segment of the pelvic floor shares in it by a yielding of some of its parts. There are so many varied opinions as to the etiology of prolapse that one can safely say the subject is not fully settled. In my opinion much credit is due to Drs. Hart and Barbour for their excellent investigations on the structural anatomy of the pelvic floor. After considerable careful dissection I feel quite sure that many previous views must be changed, but it is hopeful when the closest and most continued students of the pelvic floor come nearly to the same conclusion. The subject of prolapse, I think, should be studied out

anatomically and clinically. The field of investigation is still large. As time goes on the uterus itself will get less attention and the pelvic floor more. The subject of relaxation and submucous laceration will be more studied. Relaxation of the whole pelvic floor, due to repeated labors, infectious processes and anatomic lesions will be found to be a large factor in prolapse. Insufficiency of perineal support should not be lost sight of, and the sphincter apparatus of the pelvic floor will be more studied. From dissec-

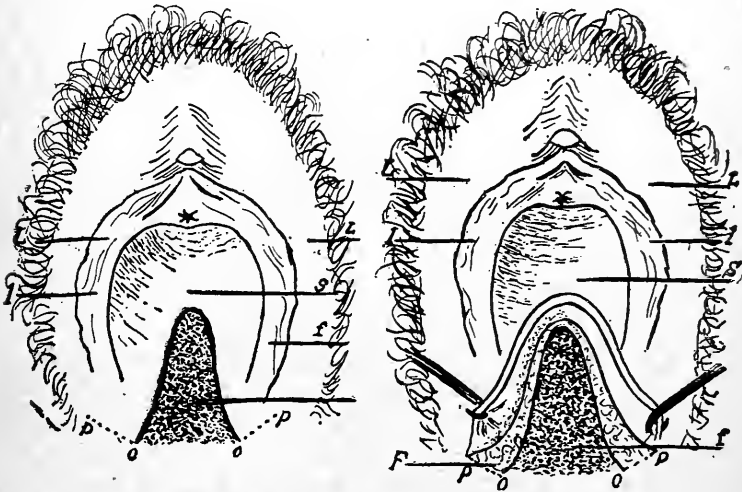


Fig. 23 *a* and *b*.—Fritsch-Walzberg method. The figure is according to Pozzi. The laceration extends into the rectum. S, rectovaginal septum; F, rectovaginal septum lacerated; P, perineum. In *b* the rectovaginal septum is split.

tion one would at once conclude that the levator ani fascia and the triangular ligament were the main supports in the pelvic floor, and the relations of other supports must be considered. Dissection is the only intelligible way to understand the subject. For example, dissection of quite a number of bodies has thoroughly explained, in my mind, the conflicting views of anatomists and gynecologists as to the posi-

tion of the uterus. As a gynecologist I have examined several thousand women, and I am sure that the uterus leans forward in the normal condition. Repeated examination on the back and while standing will prove that slight anteversion is the normal position of the uterus. Now, the anatomist has often insisted that normally the position of the uterus is in the hollow of the sacrum. I have repeatedly found in the dead subject that the uterus is in the hollow of

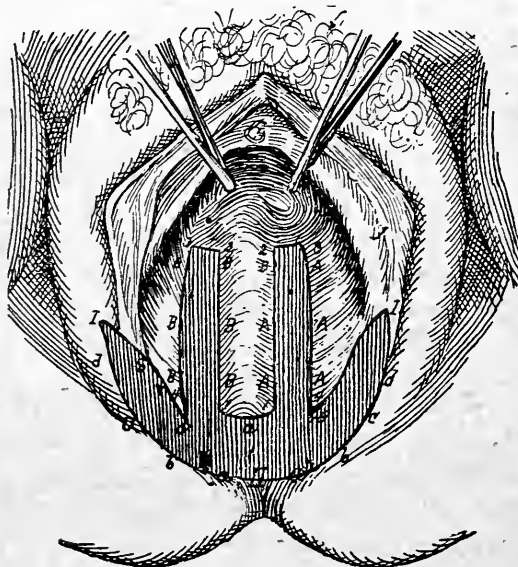


Fig. 24.—(After Hegar and Kaltenbach.) Bischoff's method of colpo-perineorrhaphy. He denudes high up on each side of the posterior median vaginal column, B, B, A, A. This method partially foreshadowed Emmet's operation. Note the butterfly wings, 1, 2, 3, d, d. Bischoff saved the posterior vaginal.

the sacrum, precisely as the anatomist has described. Both gynecologist and anatomist are correct. In the living woman the normal position of the uterus is that of anteversion. In the dead woman in dorsal decubitus the uterus generally lies in the hollow of the sacrum. In just such a manner arise the differences of opinion relative to prolapse, which can only be



cleared up by careful personal anatomic and clinical investigation. A comparison of different causes will soon let in the light.

Though the peritoneal supports of the uterus be deficient they can be put at rest and finally cured by carefully planned operations on the vaginal sphincter apparatus. All primary uterus supports are attached to the neck of the uterus and before the uterus shows such signs of hernia the supports attached to the neck must be definitely elongated. Doubtless the uterine supports are frequently elongated by infective processes and hence a rest by repairing and fortifying the sphincter vaginal apparatus will result in restoration. Especially is this true in certain forms of retroversion. If the uterus remains in its normal position (i. e., perfectly movable) no retroversion and consequent prolapse will arise. In chronic infective processes the pelvic organs at times swell, soften, become edematous, ending in a form of hypertrophy from static congestion. I have frequently observed this slow repeated process in the clinics.

#### ETIOLOGY OF PROLAPSE.

1. Insufficiency of sphincter apparatus: *a*, levator ani muscle; *b*, triangular ligament (anterior posterior layers and fascia of Colles); *c*, levator ani fascia, superior and inferior; *d*, perineum (composed of levator ani, bulbo-cavernosus, transversus perinei and sphincter ani ischio-perineal ligaments); *e*, vaginal walls; *f*, urethro-vaginal septum; *g*, recto-vaginal septum; *h*, muscular and elastic tissue on lower third of vagina.

2. Insufficiency of peritoneal supports: *a*, utero-sacral ligaments; *b*, round ligaments; *c*, broad ligaments; *d*, vesico-uterine ligaments; *e*, perineum; *f*, elongated cervix.

3. Intra-abdominal pressure increased or applied in abnormal directions.

4. Relaxation of anterior segment of pelvic floor: *a*, repeated labor; *b*, submucous, concealed facial lacerations; *c*, subinvolution of pelvic floor and organs.

5. Weight of uterus, which affords surface for intra-abdominal pressure.

#### OPERATIONS FOR PROLAPSE.

1. Tait's flap operation (and extension) of perincum.
2. Perineo-episiorrhaphy.
3. Elytro-perineorrhaphy.
4. Elytrorrhaphy.
5. Amputation of cervix.
6. Shortening of round ligaments (Alexander-Adams).
7. Shortening of broad ligaments.
8. Fixation of the uterus to the abdominal wall (hysteropexy).
9. Schucking's operation.
10. Herrick's operation.
11. Mackenroat's operation.

The operations for prolapse have been as varied as the views of its causes. Operators have attacked the uterus, vagina, vulva and uterine ligaments to accomplish their purpose. The pioneer idea in prolapse was to close up the vulva so that the uterus could not escape. Thus we have the early episiorrhaphy of Fricke and Kuchler. But surgeons soon saw that simply closing up the vulva was like attempting to board up Mount Vesuvius. The forces at work were not at the vulva but deep in the interior. Then came the operations on the perineum with all their variety, from Guillenneau's successful case through Dieffenbach, Langenbeck, Simon and Sims, to the modern flap operation. Finally to episiorrhaphy and perineorrhaphy were added operations on the wall of the vagina (colporrhaphy and elytrorrhaphy). Elytrorrhaphy has been quite a successful addition to gyne-

cology, but it is a denudation operation and hence destroys valuable tissue. I have observed that the European operators attempt to save anterior and posterior columns of the vagina. Men see in the column a valuable piece of supporting tissue, and some of them, like Martin, try to save it. Dr. Emmet has worked along the same line, and his operation is one of the most useful of its kind, and if mastered and done thoroughly is successful. In it he has combined the best principles of the denudation method. It

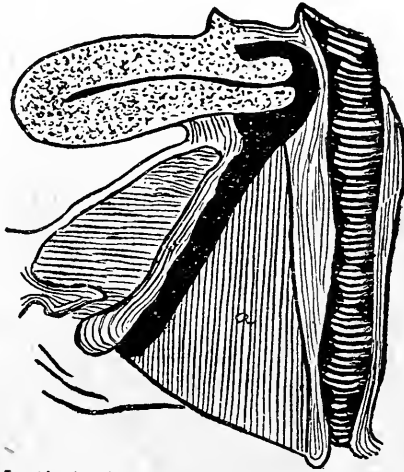


Fig. 25.—(A. Martin.) Colpoperineorrhaphy posterior according to Hegar; a, is the newly-built perineum.

saves the columns and denudes the areas of least resistance. His idea of supporting the pelvic floor is certainly correct. If the flap-splitting method could be made use of in this operation it would be a marked step in advance. The vulvar and vaginal operation of denudation should be superseded by the flap-extension method, which might be called perineo-episiorrhaphy. It is done with no loss of tissue and can be carried right up to the urethra. The amount of flap and consequent barrier of tissue built up at the vulva

will depend on the depth of the scissors' clip and the amount of exposed tissue, and also much on the manner of suturing the surfaces to be coapted. The flap-extension method will form one of the best supports for prolapse. The objections against the Alexander-Adams operation are: 1. Unsatisfactory reports and

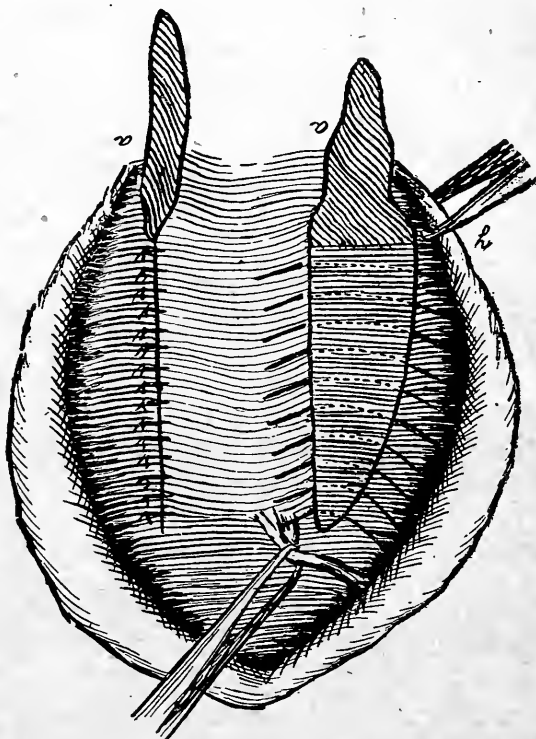


Fig. 26.—Colpoperineorrhaphy after A. Martin. He styles it elytrorrhaphia duplex lateralis. The first step is to resect or denude the two vaginal flaps; the left side is freshened and sutured; the right side freshened with the sutures, but not tied. *a, a*, the denuded vaginal flaps.

the bias in selecting cases for the operation. 2. In quite a number of bodies the round ligaments can not be found. In many cases which I investigated no muscular ligaments could be discovered until one got inside the internal abdominal ring. 3. No oper-

ator can tell in which cases the difficulty will occur. 4. The danger of opening the peritoneum. 5. The round ligaments are insufficient for a main uterine support. 6. Hernia may follow the operation. 7. In case of uterine adhesions the ligaments will not raise and support the uterus. Results will not be permanent. The round ligaments will gradually yield to uterine weight, especially if there be an enlarged uterus, as is often the case in prolapse.

Some of the above objections may be modified. The Alexander-Adams operation is an excellent one in selected cases; in retroversion without adhesions it will frequently be of great utility. But it is here mentioned as an accessory operation to colpoperineorrhaphy. Shortening the broad ligaments is of questionable value. Hysteropexy, or the fixation of a movable organ, is against all physiologic principles.

Schucking's operation for prolapse is not yet established, and it seems the bladder would be in great danger of being wounded during the operation. Herick's operation of attaching the cervix to the posterior vaginal wall has made little definite progress. we have not yet learned how to utilize the sacro-uterine ligaments in prolapse. Such operations are but accessories to colpoperineorrhaphy. The advantages of the flap operation are:

1. The ease and simplicity of its performance.
2. It wastes no tissue; if it fails the patient is no worse off than before the operation, whereas the failure of a denudation operation leaves serious defects.
3. It is the only operation that restores in a natural method the perineal body. The linear cicatrix is split and sutured in the opposite direction. Dr. Emmet's operation unites the perineal wound artificially by uniting tissues not previously connected.
4. It withstands subsequent labors; several of our operations have withstood perfectly subsequent labors.

Mr. Tait informed me of the same fact in many of his operations.

5. The sutures are not passed through skin or mucous membrane, and therefore are not so liable to suppurate or produce pain.

6. The certainty of healing.

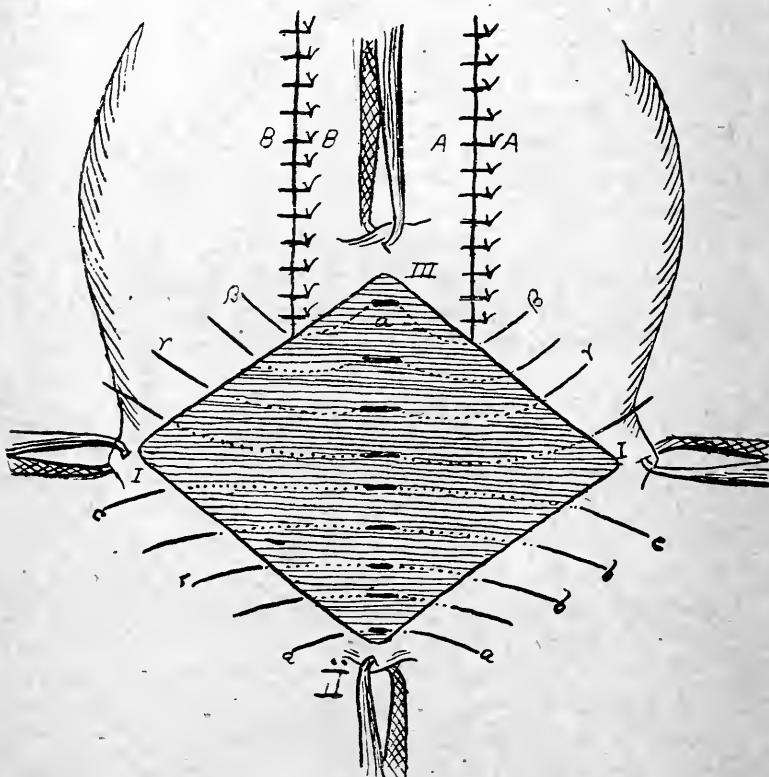


Fig. 27.—Second step in A. Martin's colpoperineorrhaphy. He calls it perineauxesis; *a* and *b* show the lines of the vaginal denudations sutured (elytrorrhaphy). The diamond-shaped space, 1, 2, 3, is the perineorrhaphy following the colporrhaphy posterior. The letters indicate the sutures.

7. The flap operation secures in the easiest and most convenient manner the widest possible surface for coaptation and healing of the fasciæ and adjacent tissues in the median line for support.

8. The pain after the operation, in my experience, is less than after the denudation operation.

9. Tait's flap operation can be practised successfully where the repeated denudation operation can not be performed because of loss of tissue and excess of tension.

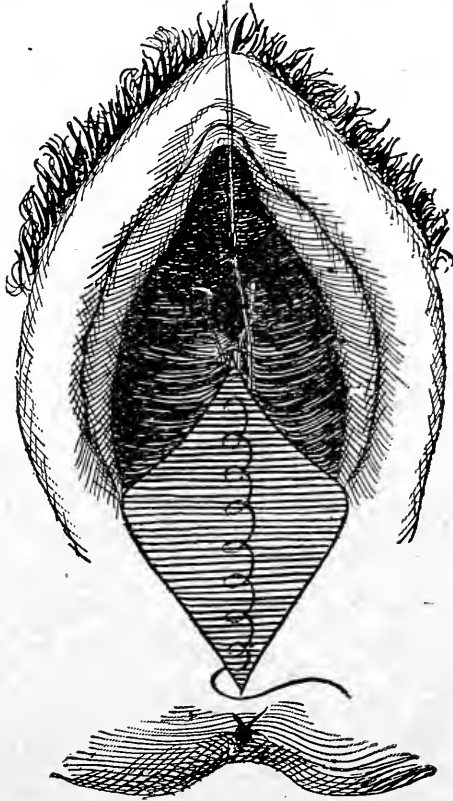


Fig. 28.—Martin's operation with a continuous catgut suture (etagenäht). It is a continuous buried suture.

10. The short time required to do Tait's flap operation minimizes shock.

11. The resulting cicatrix is in its natural location and linear, and will thus cause less peripheral nervous disturbance.

12. The stitches leave no cicatrices and therefore will cause no irritation. One can observe the most practical and best observers trying to save the column and trying to perform denudations in the vaginal sulci. The superiority of Tait's flap operation is that it saves all tissue and builds a natural perineum in a natural location, and thus subserves natural forces

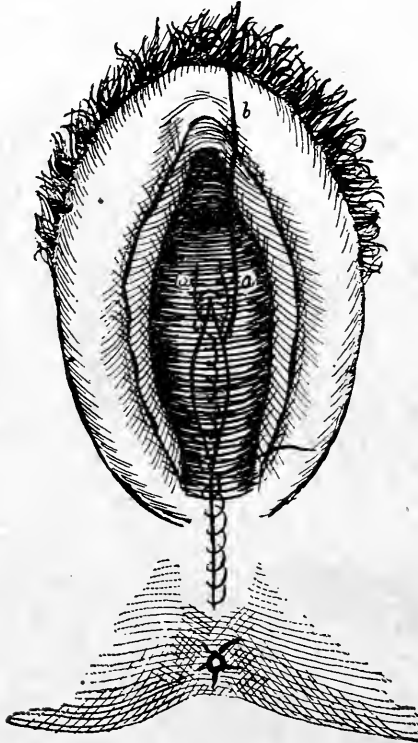


Fig. 29.—Martin's operation with buried catgut. The upper part (elytrorrhaphy) posterior colporrhaphy; the lower part (perineauxesis) perineorrhaphy; *b*, the upper end of thread; *c*, lower end of the catgut.

according to nature's original law, and anatomic structures are not much violated by cicatrices and cicatricial contraction.

A fact not generally appreciated is the neurosis, the neurasthenic condition produced by perineal lacera-



tions. The visible wound is not always commensurate with the suffering. There may be a visible wound, an infection atrium, or simply an over-stretching of muscle and fascia, which stretches and traumatizes the peripheral nerves, producing nervous irritation. The fascial planes which hold the blood-vessels in distinct relation, are so damaged that congestion and de-congestion of the pelvis frequently arise. Healthy veins should be spiral and uniform in caliber. The

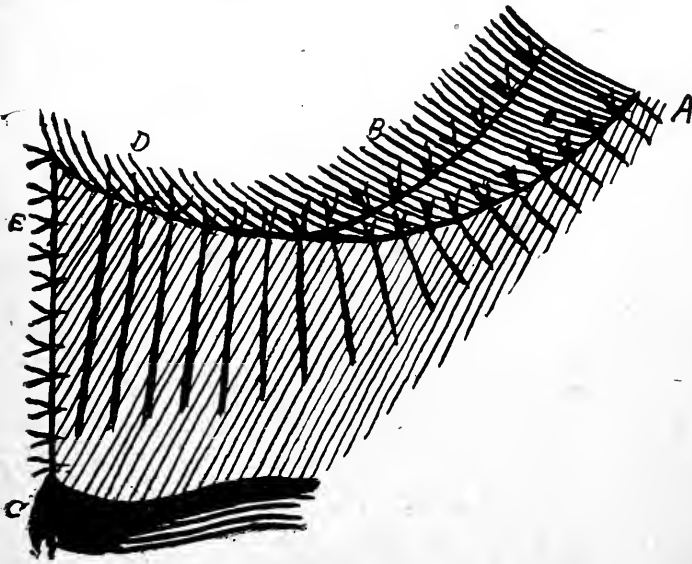


Fig. 30.—Profile view of A. Martin's colpoperineorrhaphy posterior. A, B, elytrorrhaphy; D, E, C, perineauxesis.

laceration of the pelvic fascia allows the veins to straighten out and become irregularly dilated. This straightening out and dilatation produces not only blood and lymph congestion, but peripheral nerve pressure. The frequent pelvic congestion and de-congestion from deficient blood-vessels' support, produce conditions which favor the development of pathogenic microbes in the genital mucosa. The gyn-

ecologist sees many patients with neurotic phenomena which can only be attributed to perineal lacerations and defects.

When the sutures are tied the newly formed perineum will look enormously longer, but it will soon shrink to the natural condition. After some experience one can do the flap operation so that on healing the linear cicatrix will resemble the old raphe so

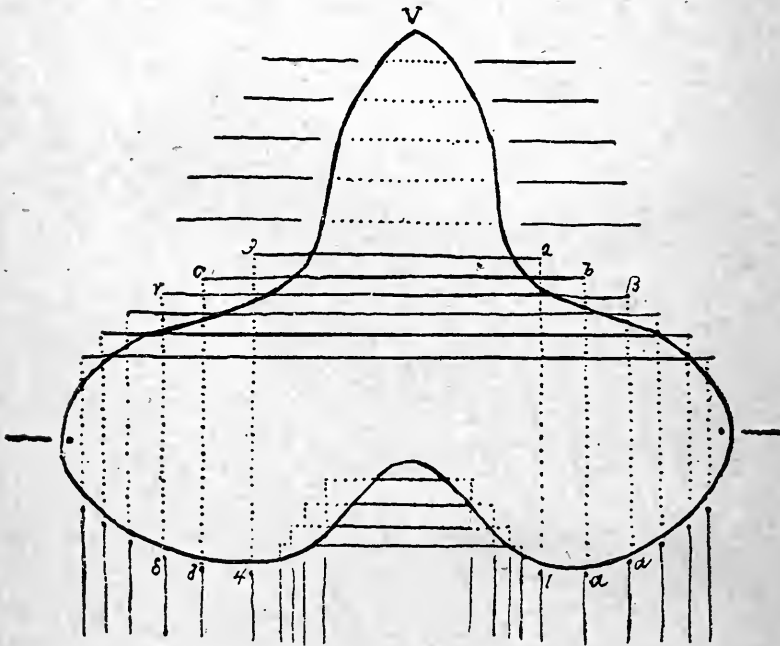


Fig. 31.—Hildebrandt's method of denudation and suturing. The dotted lines show the sutures under the tissues. The denuded area is that of a trefoil. Hepner's method of suture is that of a figure 8. Cleveland's method is simply a peculiar method of suturing.

closely that one can scarcely tell after six months that an operation has been performed.

For cystocele the flap operation can also be performed. The flap method is alike applicable to partial and complete perineal laceration. The operation is best idemonstrated on complete lacerations.

## GENERAL CONCLUSIONS.

1. To cure sacropubic hernia (uterine prolapse), perform amputation of the (sharp) cervix; anterior colporrhaphy; Tait's flap perineorrhaphy.

2. The amputation of the cervix is for the purpose of removing the sharp cervical point; directing the cervix backward; restoring the uterus to normal position.

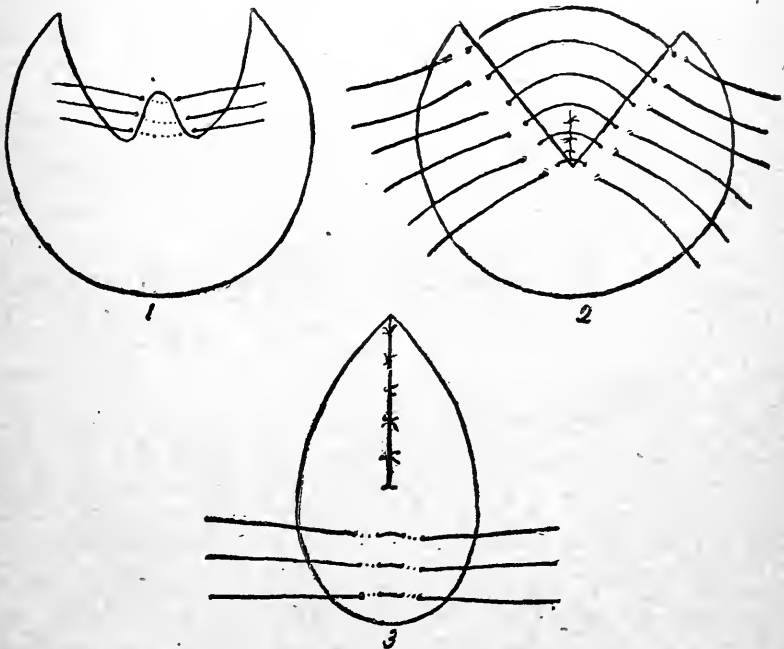


Fig. 32.—(After Pozzi.) Lautenbach's method in incomplete rupture of the perineum. 1, suture of the superior angle; 2, submucous suture of the vaginal wall; 3, buried sutures deep in the wound.

3. The anterior colporrhaphy is for the purpose of narrowing the vagina; elevating the bladder, directing the cervix backward and the fundus forward.

4. The Tait flap perineorrhaphy is for the purpose of restoring the perineum; restoring the obliquity of the genital canal; restoring such a central floor as

will efficiently support the rectum, bladder, and genitals.

5. If the cervix be not pointed and retroversion does not exist amputation of the cervix may be omitted in the above procedure.

6. If the uterus and bladder be in normal position and the vagina not prolapsed, anterior colporrhaphy may be omitted.

7. The permanent success of Tait's perineal flap operation consists in extensive flaps (by means of front and back cuts) and the drawing into the median

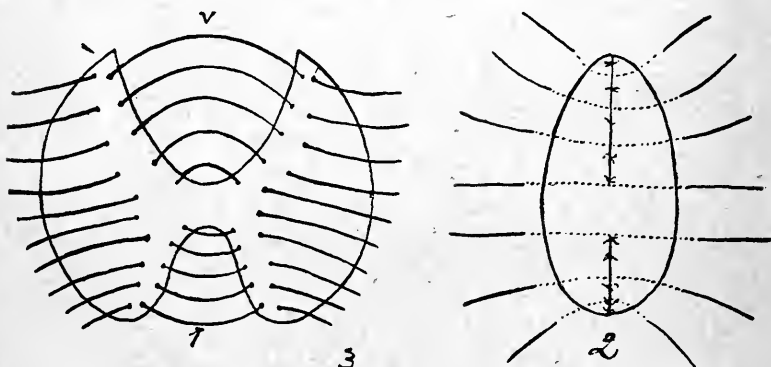


Fig. 33.—Lauenstein's suture in complete laceration. 1, introduction of sutures which coapt the vagina and rectal mucosa; 2, introduction of the perineal sutures after the vaginal and rectal have been fastened.

line of large masses of lateral tissue for a pelvic floor. These lateral masses are drawn in and secured for weeks by deep sutures of silkworm gut. These deep sutures, six to eight in number, act like splints for four to eight weeks, and though part of the wound suppurates, the sutures maintain it in coaptation while it granulates and heals.

8. Our operations have proved definitely that the rectal sphincters may be practically restored to normal, even after long periods of rupture. One case of thirty-four years' standing, with two previous unsuccessful

denuding perineorrhaphies and a complete laceration of three inches up the rectum was restored to perfect function.

9. The three surgical procedures described will obviate hysterectomy in many cases.

10. The flattening out of the operation, or the yielding of the union, or the stretching of the parts allowing prolapse, will depend especially on the flaps and the amount of tissue permanently drawn into the middle line.

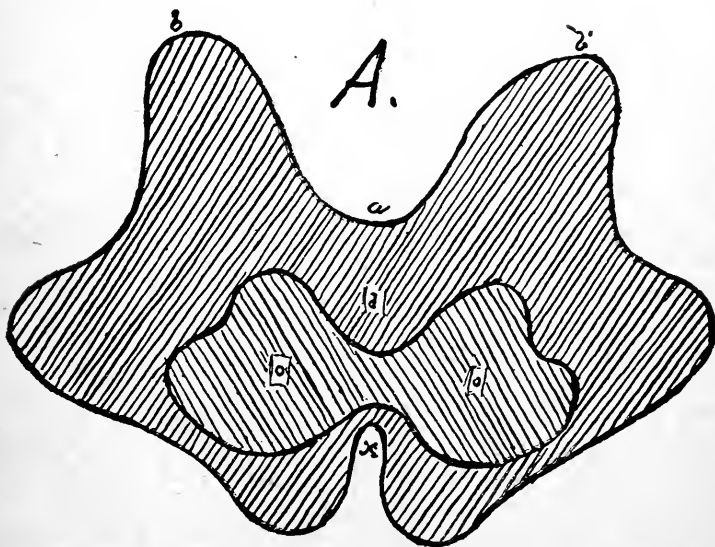


Figure 34 A.

12. We especially insist that better results are obtained by allowing the silkworm gut sutures to remain in position for from four to six weeks. Should any suppurate they may be removed at any time. Wounds do not heal very firmly under three weeks.

13. We feel decided in stating from our own experience that the flap operation should not be disturbed by dressings. The patient should be kept quiet for three days, and then a vaginal douche may be given

daily. After the first half day the wound is hermetically sealed by its own oozing. The limbs should be tied together at the knees. The bladder will generally require the use of the catheter for two to four days. Morphin injections of  $\frac{1}{16}$  of a grain may be given to quiet the pain and induce rest.

14. The dissection of the rectum from the vagina

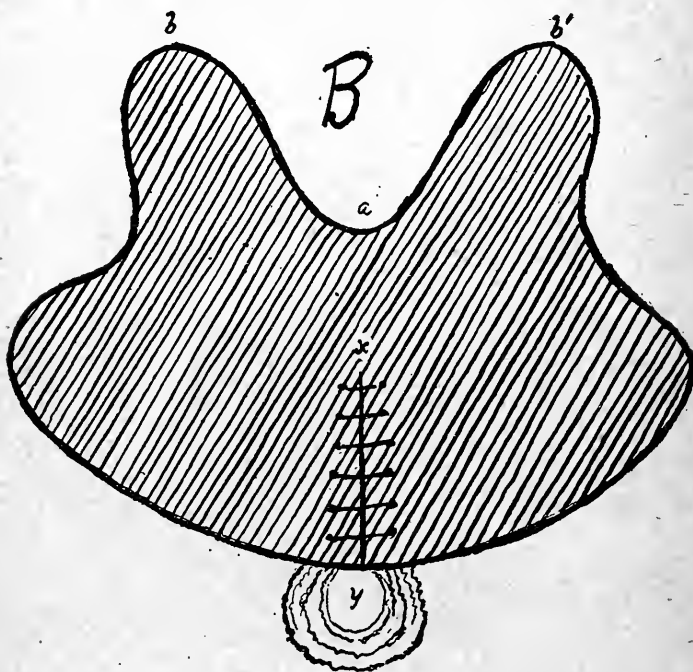


Figure 34 B.

for one to three inches, was added from my own experience, as I never saw Mr. Tait do this. This additional procedure lengthens the operation to fifteen to thirty minutes; Mr. Tait performs his operation in five to ten minutes.

15. The result of the foregoing surgical procedure has been gratifyingly successful.

16. The flap operation fits any and every case, for

it resplits the old cicatrix and restores and adds what is required.

17. In no single case, in over 150 which I have observed, was the flap operation not applicable.

18. The flap method makes little scar tissue, as the operative procedure is performed in connective tissue

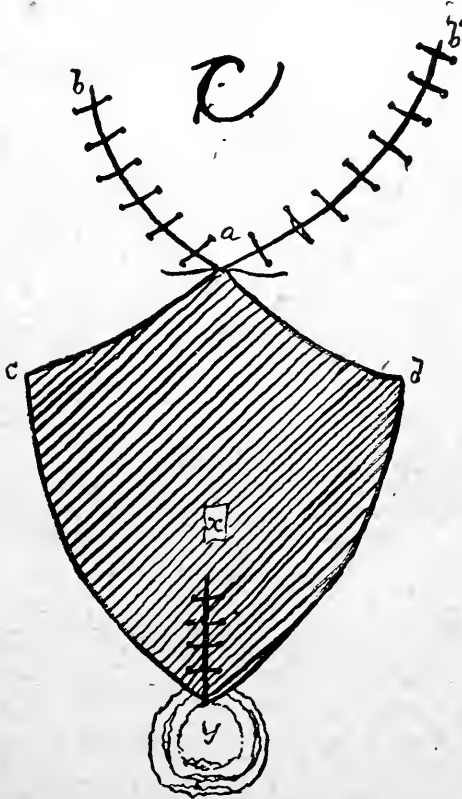


Figure 34 C.

while cicatrices form in skin and mucosa. In the flap colpoperineorrhaphy the posterior vaginal wall is made to sustain the anterior.

19. In the flap operation the vaginal walls are made to give their full support to the uterus—the posterior

wall sustains the anterior vaginal wall and bladder—and also to support and direct backward the rectal wall.

The flap perineorrhaphy has been chiefly revised and introduced to the profession by Mr. Lawson Tait of Birmingham, England. It is true the flap perineal operation was performed in various ways by others, as Duncan, Colles, Jenks, Marcy and Langen-

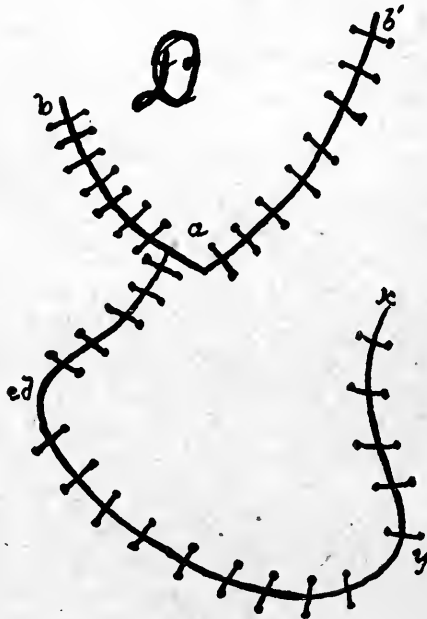


Fig. 34 A, B, C, D.—(After Pozzi.) Freund's method. Freund insists that we should make the denudation exactly as the perineum appeared when originally torn. For example, the cicatrix, O, O, originally appeared as large as B, B, X, in A, and should be denuded to that size; the line X, Y, in B represents the rectal suturing; the line of sutures, B, A, B, in C shows the vaginal part sewed up; X, Y, corresponds to the rectum suturing; A, C, Y, D, in C, the denuded perineal area, which is still unsutured; D, the final disposition of the sutures in Freund's method. It is an excellent one, but complicated, and is wrought with much sacrifice of tissue if the operation fails.

beck. But Mr. Tait gave it a new impetus, and also performed it with new phases. He performed it with elbow scissors and introduced sutures which neither



penetrated skin nor mucous membrane. As a pupil of Mr. Tait, for six months, I had ample opportunity to observe his methods of operation. The principle of operation consists in resplitting the old perineal cicatrix without loss of tissue, with fixed coaptation of the flaps. After observing Mr. Tait's methods I naturally practised the operation as performed by him and his assistants. About a year later I began to modify the operation by dissecting the rectum and vagina from each other for a variable but long distance (1 to  $2\frac{1}{2}$  inches) above the vulva or anus. This modification enabled me to apply it to almost all forms of prolapse, relaxed vaginal wall or perineal laceration; in short, in all conditions requiring perineorrhaphy and colporrhaphy posterior. The objections raised against the flap method we found, after over six years' trial, were not well founded. One objection is that Tait's flap perineorrhaphy is a "skin operation." If performed superficially it may be subject to the above criticism. However, such criticism can only be applied to imperfect execution. The operator must carefully guard against closing the vulva too far. One can easily make an excessive perineum by the flap method. This objection is, as a matter of fact, worthless. Another objection is that the flap method in no way narrows the vagina. This objection will not hold, as the vagina can be narrowed so as to embrace tightly a single index finger. In fact, we can dissect the rectum and vagina from each other for three inches, up to the peritoneum, or as high as desired, and narrow the lower third of the vagina as much as the operator sees fit. The upper two-thirds of the vagina does not require narrowing. Another objection is that it does not approximate the fibers of the levator ani. It is the operation par excellence to unite the deranged or torn levator ani fibers, because the dissection is carried beyond the levator ani fascia

superior and inferior through the levator ani muscle. In fact, it enables the operator to secure both the levator ani fascia superior and inferior, which embraces the levator ani muscle. One must secure the levator ani fascia in order to secure the levator ani

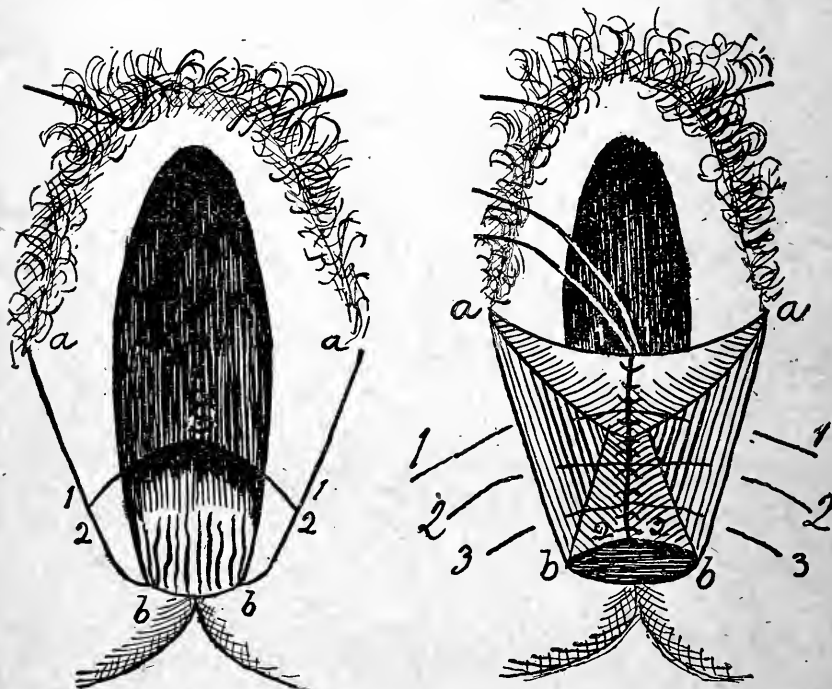


Fig. 35.—(After Pozzi.) A. R. Simpson's method. It is really a flap operation. In the left hand cut, *a*, *b* and *c* represent the lines of incision to make the flaps; *S*, vagina; 1, 1, vaginal flap; 2, 2, rectal flap. The scissors are first entered at *b*, and the point emerges at *a*, and then a clip is made; second, the scissors are entered at 1, and pushed between the vaginal and rectal walls over to 1, and a clip makes the rectal and vaginal flap. Dissect the vaginal flap from the rectal as high as the case requires. To do this, seize the vaginal flap with several small forceps, which the assistant can gently hold; also seize the rectal flaps with several small forceps and allow them to hang, as their weight is sufficient to put the flap on tension; with the two fingers in the rectum and a pair of blunt-pointed scissors the dissection of the flaps is conveniently made. The sutures are introduced as shown in the cut. Observe that in this operation four flaps are made and that the rectal and vaginal walls are sutured separately; also note that the sutures 1, 2, 3, are entered by passing through the skin. The suturing and flap making is absolutely different from that of Mr. Tait's flap method, in which only one flap is made and no sutures enter the skin or mucosa, and all sutures are in denuded tissue.

muscle, which is guarded and embraced by a definite fascial sheath. The flap operation reunites the posterior vaginal fascial septum without denudation, as Emmet's operation unites it with denudation. Both Emmet's and Tait's operations are based anatomically on the same principle—one denudes however, and the other does not, but employs a flap to cover the wound. My practice is to dissect the rectum and vagina in the lateral sulci. In the American Text-book of Gynecology the writer on "Flap-splitting Perineorrhaphy" makes the following absurd statements: "Its field of usefulness is very limited indeed. Practically it is applicable to those cases in which only the superficial and most exterior fibers of the perineum are torn." The above views can certainly be based only on imperfect knowledge, execution, or observation of the operation. We can affirm that it is one of the most certain and effective of all operations on the perineum. The flap method of colpo-perineorrhaphy is the one above all others that enables an operator to reunite the levator ani fascia superior and inferior with the enclosed levator ani muscle without blind searching, to abolish a rectocele, and to repair prolapse of the uterus. The same writer cited above makes a further statement as ridiculous as the first, that, "In no way possible can this operation (flap-splitting) narrow the vagina, abolish a rectocele, or bring together the separated fibers of the pelvic fascia." It is fortunate that this "American" text-book does not represent the views of all Americans. The flap-splitting perineorrhaphy, in the hands of those who have thoroughly practised it, has proved absolutely that it will narrow the vagina, abolish a rectocele, and bring together the separated fibers of the levator ani fascia superior and inferior with the fibers of the levator ani muscles. Also it securely unites the ligamenta ischio-perinei. The flap method is alike use-

ful in partial and complete operations, and in high rectovaginal dissections does all that Emmet's does, with no denudations, and with a better chance of healing, by avoiding the infectious atrium. Also, like Emmet's operation, Tait's flap-splitting is founded on anatomic structures and designed to restore physiologic functions. Both operations have come to stay.

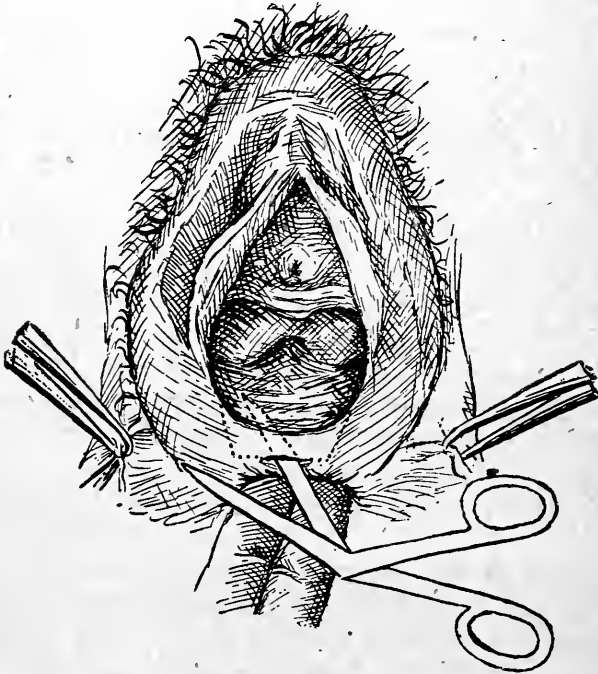


Fig. 36.—A perineal laceration to the rectum. Two fingers of the left hand are in the rectum; the recto-vaginal septum is put on lateral tension by the traction forceps on each side; the blade of the scissors is inserted between the rectal and vaginal walls, and the dotted line marks out the flap to be produced.

The conception of the flap-splitting operation rests on the pathologic conditions of the wound. If one examines a vulva with lacerations, he will see linear cicatrices, narrow white lines which are transverse in dissection. These white lines are the healed cicatrices of the old perineal lacerations. The linear cicatrix is

healed at right angles to the original wound or rent. Wounds generally heal in the direction of the tear.

On this peculiar condition of the cicatrix being at right angles to the wound is based the flap-splitting method of Mr. Tait. The transverse cicatrix is split and sutured at right angles to itself. It simulates the Heinike-Mikulicz pyloroplasty when the wound is sutured exactly in the opposite direction to its incision. It is the same procedure as one may employ in varicocele to shorten the scrotum, i.e., incise the scrotum along the spermatic cord for three inches and then suture the scrotal wound at right angles to the incision as is practised in Dr. Senn's clinic. In suturing the split cicatricial wound at right angles to itself we restore exactly the original normal structures of the perineum. By this method the perineum and relations are restored to the normal condition, which alone will withstand subsequent labors. The patient should be prepared for three days before the operation by cathartics, so that the digestive tract may be thoroughly evacuated. The cathartics should be so administered that all defecation should cease 8 to 10 hours before the operation. There will then be no feces in the rectum during the operation nor for some hours subsequent. The patient is anesthetized, and lies on the back. The instruments useful in this operation are elbow scissors, a handled needle with an eye in its pointed end, and strong silkworm gut. The silk worm gut should be thoroughly washed with soap and water. The index and middle finger are introduced into the rectum, and the recto-vaginal septum is divided in the linear cicatrix. The scissors point is then forced under the skin of the labia and carried upward as far as desired and clipped. The opposite side is treated exactly the same. Back cuts are now made on each side of the rectum as long as desired. In slight operations the back cuts are not

required. The anterior vaginal flap is seized with forceps and drawn forward, while the posterior rectal flap is seized and drawn backward. We dissect the rectum from the vagina as high as desired ( $1\frac{1}{4}$  to 3 inches). At the same time the lateral space on each

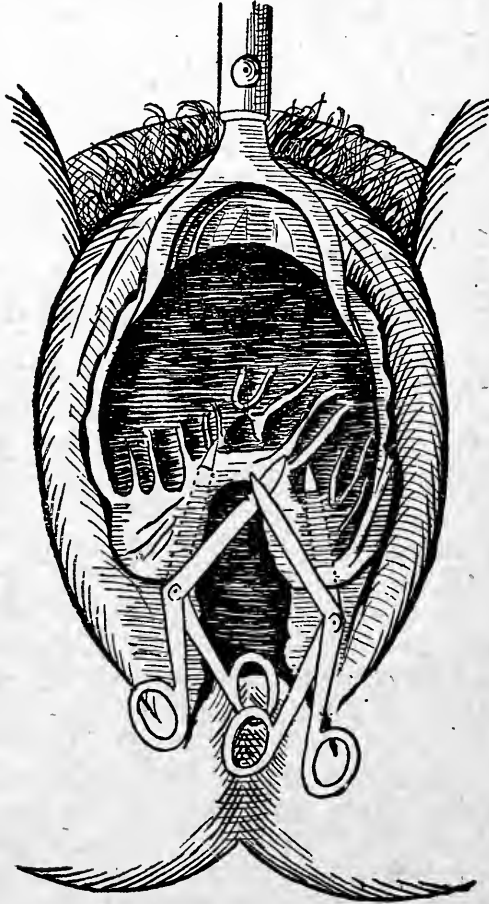


Fig. 37.—(Modified from Pozzi.) A very extensive recto-vaginal laceration of old standing, with large radiating cicatricial tissue showing healing lines. The scissor blades on each side introduced between the rectal and vaginal walls at the cicatricial margins illustrate how the flaps are produced. "Back cuts" extend to the scissor handles; the back cuts are made to produce a larger perineal body. A Sims' speculum is inserted into the vagina, anteriorly.

side of the vagina is dissected as extensively as is required to make the perineal body. (See Fig. 19) The two fingers of the left hand are kept continually in the rectum as a guide. The extent of the dissection is governed by the condition of the parts, the size of the wound, and the object in view; whether it be narrowing the vagina, extension of the perineum, or almost closing the passage for prolapse. With considerable dissection, a few arteries may need clamping; however, the hot irrigation will nearly always be sufficient to check the hemorrhage. If the bulb be cut it will bleed profusely, but sponge-pressure will soon check it. If the scissors cut open a vulvo-vaginal abscess the whole gland should be dissected out and disinfected, in order to avoid an abscess in the wound.

The second step of the operation is to introduce the sutures of silkworm gut. The two fingers are removed from the rectum and well cleaned. The point of the handled needle is introduced at the upper angle of the wound (No. 2 in Fig. 21) without penetrating the skin or vaginal mucous membrane, carried along about one-half inch from the distal edge of the vaginal flap and made to emerge at the median raphe. It is then threaded and drawn out. The point of the needle is again introduced at the upper angle of the wound on the opposite side (No. 4 in Fig. 21), forced along the distal edge of the flap about one-half inch from the edge and made to emerge again on the median line. It is threaded and drawn out. This constitutes the first suture. Generally three anterior sutures are introduced in the above manner. To introduce the posterior sutures (three or four) the index finger should be placed in the rectum as a guide, to avoid passing the needle too close to the rectal mucosa, endangering fistula. The fistula may arise quickly or slowly. If quickly an abscess will arise;

if slowly (two to four weeks) a fistula will arise and remain a longer or shorter time. In one case a fistula persisted for three years. The posterior sutures are introduced similar to the anterior. However, they should be deeper and should thoroughly include the levator ani fascia superior and inferior with the

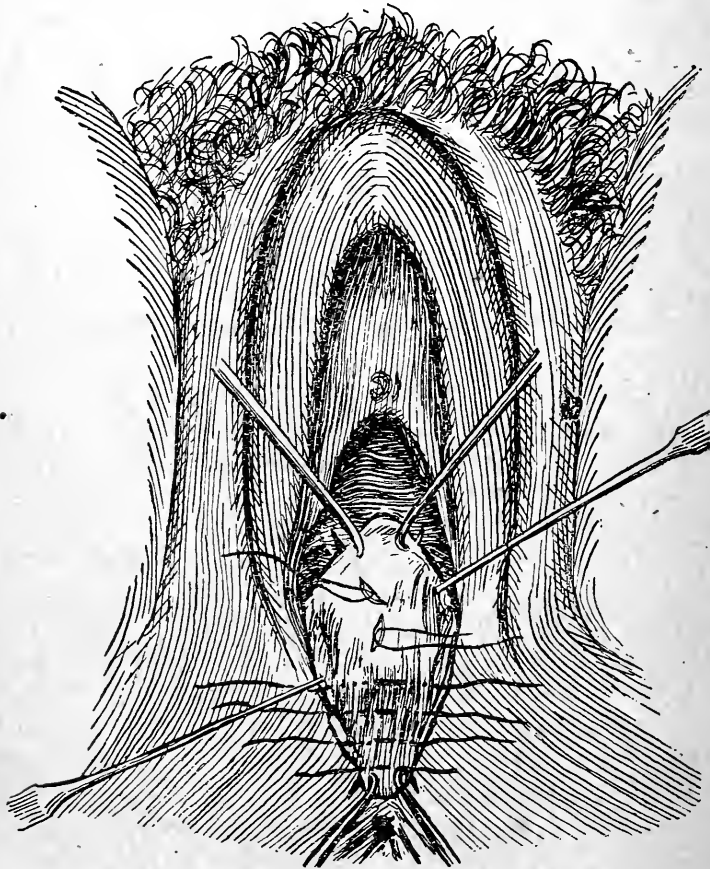


Fig. 38.—(Author.) A stage in progress of the flap-forming colpoperineorrhaphy. Here the sutures appear as if the process had started at the anus, but the safest and most practical method is to begin to introduce sutures and tie from the anterior end. All sutures are threaded in the median line. The needle may be thrust across the entire denuded field, but one can make more perfect and deeper suturing by doing one-half at a time.



enclosed levator ani muscle. The point of the needle is passed into the edge of the wound, avoiding the skin, and pushed onward to the median line, where the point emerges, is threaded and drawn out. It is again introduced on the opposite side and threaded in the middle. In all cases requiring extensive dissection the needle should be passed through half of the wound only. In the less extensive part of the wound the needle may pass through the whole wound at once. Mr. Tait employed three to five sutures. We employ five to seven sutures.

The third step is to tie the sutures of silkworm gut. All the sutures are seized at the distal end by the left hand while the right hand pushes the tissues of the wound as far toward the loop of the sutures as possible. This is a partial step, as it narrows and puckers the wound very much, so that when each individual suture is tied it assumes its final location. The sutures should not be tied too tight, as they are apt to cut through considerable tissue. After the sutures are tied, a linear gap of considerable width will exist in the median line, for the sutures do not penetrate the skin, and hence will not draw it in close coaptation. Here some of the inexperienced will be tempted to place a few skin sutures to avoid the gaping of the wound. Be sure not to do it, for they cause pain and may produce an abscess; when the legs are placed together the edges of the wound will coapt. The ends of the sutures should be left long and all tied into a single bundle. The after-treatment consists in applying no dressing or chemicals to the wound. If there be considerable pain small hypodermic doses of morphin may be used for thirty-six hours. Most patients will require catheterizing, from trauma to the distal ends of the pubic nerves. After forty-eight hours we begin to give two quarts of a vaginal douche, evening and morning. The bowels

should be moved on the third or fourth day by means of calomel given in small doses (1 grain two or three times) and followed by teaspoonful doses of  $\text{MgSO}_4$ . Diet should be regulated and limited for three days before and three days subsequent to the operation.

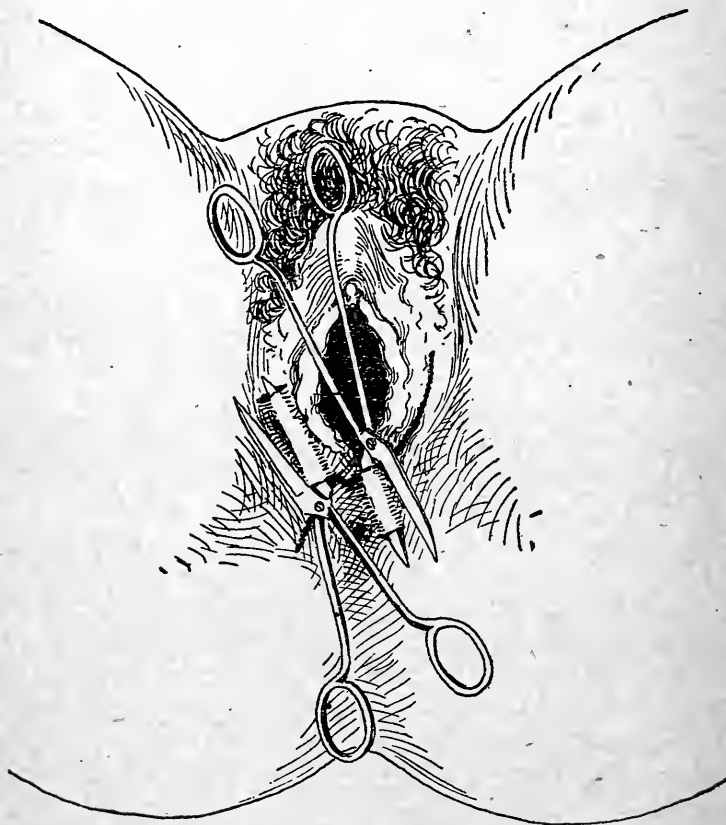


Fig. 39.—(Robinson-Holland.) Method of formation of anterior and posterior flaps in the flap method of executing colpoperineorrhaphy.

The patient should lie in bed for at least two weeks, and afterward get up as she is able. The sutures should be watched. If one becomes loose it should be removed. If none become loose or separate they may remain for three, four or even six weeks. Three

weeks is soon enough to remove the sutures. The wound heals more firmly with the sutures in for four weeks or more. The sutures act like splints, holding the surfaces in fixed coaptation, avoiding motion, which interferes with perfect union. The sutures often give pain on removing, and it would perhaps be better in some neurotic cases to anesthetize the patient. However, I never practise it. Amateurs must be warned not to close the vulva unnaturally tight as it might disturb marital relations. The cuts in the article will show the steps in the technique.

#### THE EMMET OPERATION.

This operation is in marked contrast to all previous ones for similar purposes, as union of the denuded labia was the first procedure. The peculiarity of Emmet's operation consists in denudation of the lower median posterior vaginal wall; bilateral denudation of triangular portions of the lateral sulci of the vagina; in the method of introducing the sutures, which are so arranged that on tying they lift the prolapsing parts toward the pubic arch, restoring anatomic structures, as the H-shape to the vagina and the normal curve of the vagina. The patient should be prepared for several days by cathartics and daily skin baths. The bowels should be evacuated by eight to twelve passages, so that no feces will be in the rectum while operating, nor for 24 to 36 hours after. Thorough salt rubbing of the skin not only stimulates the apparatus of the skin to the climax of secretion but reflexly stimulates the bowels and kidneys to active secretion. In short, place all secretory organs—skin, bowel and kidney—at their maximum activity for the operation. Place the anesthetized patient on the back, with an assistant holding each limb. With tenacula fixed to definite points of the vagina, as for example, one at the median crest of the rectocele, one

tenaculum on each side of the vagina at the highest point of the triangle of denudation in the sulci and one on each side of the posterior vaginal wall at the junction with the skin and mucosa, one can mark the outline of the denudation with a scalpel. It is well, before denudation, to test whether the area is too large to insure coaptation of the wound without undue tension. The area defined by the tenacula is

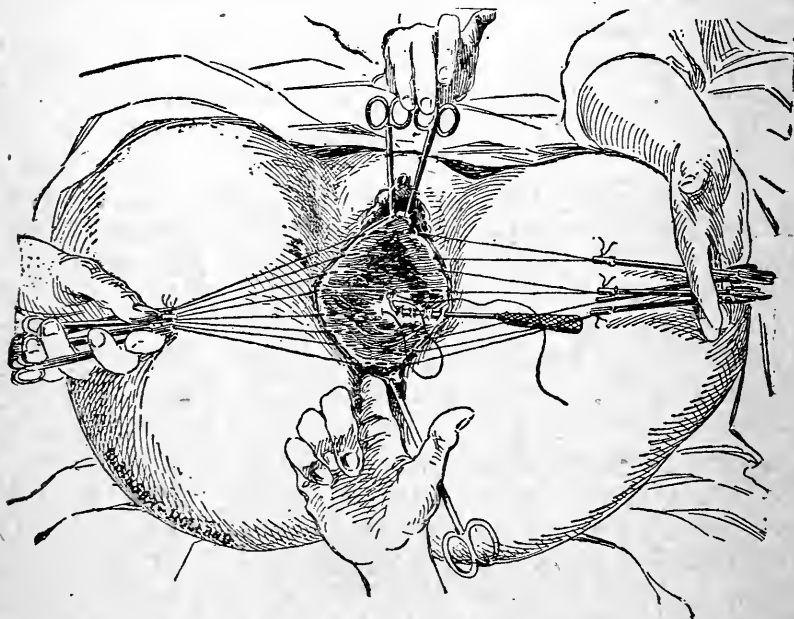


Fig. 40.—(Robinson-Holland.) Method of introducing the sutures in the flap method of colpoperineorrhaphy. Note that the handled needle is threaded in the median line. This cut was drawn from a photograph taken of a patient during the operation.

denuded by the operator cutting off long strips of vaginal mucosa with scissors curved on the flat. Others denude with the scalpel, rolling the denuded vaginal flap on a staff or on the fingers. With experience, large areas may be rapidly denuded. The area requiring denudation in the lateral sulci depends on the amount of slack in the posterior vaginal wall, for

this operation has the special merit of narrowing the vaginal canal. With a typically relaxed vaginal outlet a large area of denudation will be required, and especially high in the right and left vaginal walls. The denudation should consist of the whole thickness of the vaginal wall. Continuous hot water irrigation over the denuded surface will check the hemorrhage. The operation is eminently a posterior colporrhaphy, and the success will depend on denudation in the lateral vaginal sulci, and not on the denudation of the so-called perineum. In case the vaginal wall is very slack and thin it is well to extend the denudation deep into the bilateral subvaginal tissue in the vaginal sulci. Perfect denudation is a requisite; no islands of vaginal mucosa must be left. The second step of the operation, equally important with denudation, is the plan of introducing the sutures. The object of the special planning of the sutures is to lift the lax vaginal outlet upward toward the pubic arch, restoring the vaginal condition. The skill in planning the denudation in the right and left sulci of the vagina is no less than that employed in the introduction of the well-devised plan of sutures. The chief materials for sutures are silver wire, silkworm gut, and catgut. To suture the denuded surface expose one of the triangles in the lateral vaginal wall. Begin to suture at its apex, passing the suture transversely across the angle, after which immediately tie it. The second suture is passed one-quarter of an inch from the first (four sutures to the inch). The needle is passed through the vaginal wall and subvaginal tissue toward the operator (in an anterior posterior direction), whence it emerges, and is re-entered at the same point and passed in an antero-posterior direction under the subvaginal tissue through the denuded triangle, emerging on the vaginal mucosa at the edge of the wound. This makes the suture, before tying, represent a tri-

angle, with its apex (at the emerged points of the suture in the denuded triangle) toward the operator, and characterizes the plan of suturing; i. e., they are introduced in an antero-posterior direction, and by tying, they lift the vaginal outlet toward the pubic arch. The next suture is introduced by passing the needle through the vaginal wall (on the internal side

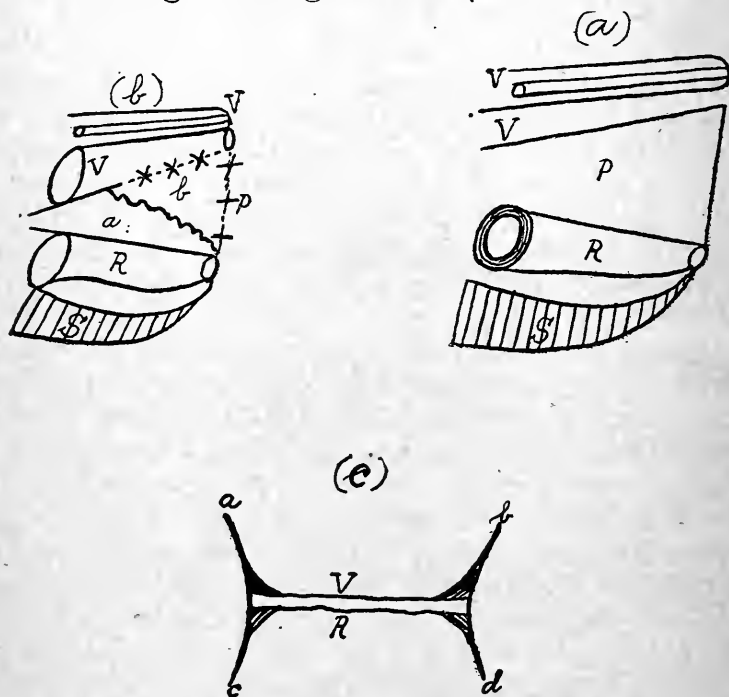


Fig. 41.—(Author.) Diagram of the plan of Tait's flap colpoperineal raphy: a, S, sacrum; R, rectum; P, intact perineal body; V, vagina, with urethra above it; b, has had the torn perineal body, P, repaired by the six sutures marked by stars; c, shows the H-shaped anterior cuts, a, b; c, d, the posterior cuts; R, rectum; V, vagina.

of the triangle) deep into the subvaginal tissue of the denuded triangle (directly toward the operator), whence it emerges, and is re-entered at the same point and carried upward and outward (away from the operator) very deeply under the denuded area, emerg-

ing on the vaginal mucosa at the external side of the triangle. The sutures on the external side of the denuded triangle should be especially deep and should include extensive tissue. Generally three or four sutures are sufficient to close the triangle of each sulcus. The suture at the base of each triangle may be called a tension suture. It can be tied as soon as passed, which will enable more superficial sutures to be applied to the upper part of the triangle. The crown or pursing suture is now passed within the vagina by introducing the needle in the mucosa on the lateral vaginal wall close to the incision, a short distance below the center of the triangle. The needle should emerge in the subvaginal tissue in the sulcus below the point of introduction. The needle is re-entered and carried across the vaginal sulcus just below the vaginal incision, emerging at the opposite side. One or two auxiliary pursing sutures are added and the several sutures tied; superficial sutures are then added, as required, to close the gaps in the wound. The deep sutures should be of silkworm gut and the superficiales of catgut.

In this essay it is not the purpose to discuss immediate repair after labor, but the views are directed toward chronic damage of the vulva, vagina and pelvic floor. It will require careful examination of the vulva, vagina and uterus to decide in certain cases what will be the wisest plan to pursue. Some cases show extensive laceration with but few symptoms, while others show little damage, but complain of severe suffering. Such differences rest on visible and invisible supports. Extensive perineal lacerations demand repair whether they create symptoms or not, as such lesions will in all probability lead to illness. One may occasionally meet a patient who has had a perineal operation, and the perineum to all intents and purposes appears normal; yet an exami-

nation reveals the fact of a rectocele above the restored perineal body, and the patient confirms the results of the examination by still announcing herself as suffering. In operating, the dissection of the so-called perineal body should extend as high on the recto-

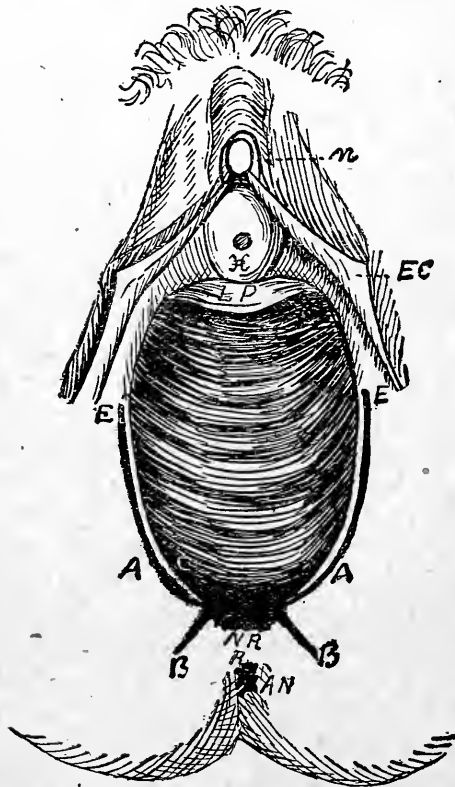


Fig. 42.—The outlines of the anterior "cuts," (A, E,) and posterior "cuts" (A, B,) in the flap colpoperineorrhaphy. *n*, Clitoris; *h*, urethra; *L, P*, anterior vaginal wall; *A, N*, anus; *N, R*, perineum; *E, C*, labia. The vaginal orifice is wide open. The laceration is not complete, *i.e.*, it does not reach the rectum,

vaginal septum as there appears redundancy of the posterior vaginal wall (rectocele). Nothing less will cure the patient. The perineal body, in its broadest sense, is a resistant ligamentous, fibromuscular struc-



ture which closes the abdominal cavity below. The body begins to be supported from the curved white line located on each side of the pelvis, as one may be impressed by looking into a pelvis from above. It is bowl-shaped, and as soon as this peculiar shape becomes lost, the supports have given away at some point. Observed from below the perineum is narrowed to the space between rectum and vagina. The flap operation is capable of repairing any defect in the pelvic floor. In complete laceration the anal and vulvar orifices are in direct communication, like a cloaca. The rectovaginal septum may show a boot-jack angle or an irregular arched outline. The irregularly-torn outline of the rectovaginal septum shows a double-walled layer or curved sides. At the upper angle of the lacerated rectovaginal septum the rectal mucosa pouts, rolls and appears as a red or pink ground which aids in locating the line to split the flaps.

After the rectovaginal septum has been lacerated for a long time it presents irregular cicatricial bands, some of which are thin, others thick, assuring different stages of atrophy and contraction. Bridges or bands of tissue may stretch from one point to another showing a penetrated condition. Again, the lower edges of the lacerated rectovaginal septum may be drawn upward by the fibers of the levator ani still embracing the parts by the aid of its double fascial sheets. Besides small, irregular depressions may be felt or observed where the stump of a bundle of the levator muscles has been torn away and retracted. The deep sutures applied after splitting the septum will include these stump ends of the muscles by means of fascia so that they may be again forced to the median raphe and fixed there. The flap operation does not need to observe whether the sphincter, anus or rectovaginal septum be lacerated, for it is alike

applicable to each and all. On examination we may find all kinds of associated conditions with extensive colpoperineal lacerations, as lacerated cervix, subinvolution of the vagina, cystocele, rectocele, and retroversion of the uterus. Now if the uterine appendages

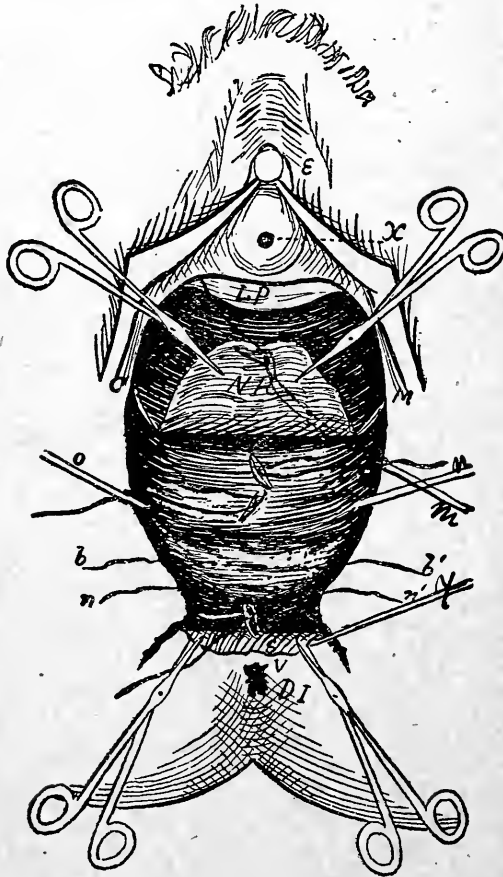


Fig. 43.—Dissection of the flap and the anterior vaginal wall, N, R, drawn up with forceps. The posterior flap, S, is drawn backward by forceps, two sutures, *b, n*, are already passed; three more sutures, one being introduced by passing the curved-handled needle from the lateral edge of the wound to the middle of the denuded surface and threading it from the median line with silkworm gut; D, I, anus; V, perineum; E, clitoris; X, urethra; L, P, anterior vaginal wall.

are freely movable we can generally cure the patient by curettement, repair of the cervix and colpoperineorrhaphy, for much of the disease observed is due to disturbed circulation. The vessels have been torn from their supporting bed by the deranged fascia. The veins have become straightened out, dilated

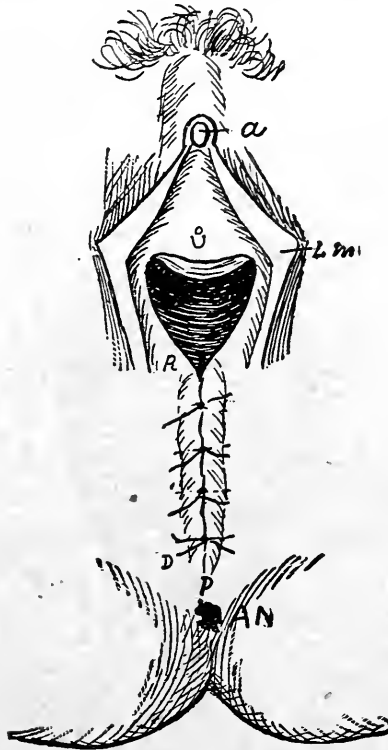


Fig. 44.—Sutures tied in the operation for colpoperineorrhaphy with incomplete laceration. A, N, anus; L, M, labia; A, clitoris; V, urethra; R, D, median line of the perineal raphe; P, posterior point of perineal space.

locally, and have lost their elegant spiral form, resulting in blood stasis, congestion. Restore the supports and circulation will resume.

The diagnosis consists of observation and palpa-

tion with the aid of a large Sims speculum. In the diagnosis a notably striking feature is the changed appearance of the vulvar outlet. Normally the perineum is widest at its upper end. With lacerated perineum or relaxed vulva the whole external appearance is changed. The narrow puckered chink or slit-like aperture of the natural vulvar orifice is transformed into a patulous gaping. Again, the normal vagina presents a sigmoid curve with the posterior vaginal wall coacting and embracing the anterior, like a valve. But in deficient vaginal apparatus these two concentric coacted curves have lost their relations, especially the posterior vaginal curve. It should be remembered, in diagnosing this deficiency at the vulva, that the non-closure is not due especially to loss of the perineal body, but to defect in the levator ani muscle and its double fascial layers. The levator ani muscle endows the rectum with its anterior curve and drags the lower end of the vagina upward and forward against the pubic arch. This fact can be demonstrated by introducing the finger into the vagina and forcing backward and downward, when by removing the finger, the vagina quickly returns to its normal position. The vaginal orifice has no distinct sphincter like the mouth or anus, but has an indirect sphincter, the horseshoe loop of the levator ani, aided by the pubic arch. The arch acts like a fixed point and the vagina is indirectly closed by shortening, contracting of the anterior bundle of the levator ani muscle. The vagina is closed by flattening its walls antero-posteriorly between the rectum and pubic arch. It is H-shaped. There is a slight puckering of the vagina at its external orifice by means of the weak bulbo-cavernosus muscle, but practically this amounts to nothing in physiology and anatomy. On account of the position of the rectum in relation to the levator muscle it produces a sigmoid curve to the rectum,

with its convexity forward. This is due to the fact that the strongest bundles of the levator muscle encircle the rectum about an inch above its orifice or lower end, whence by contraction it yields at the point of greatest force, i. e., at the sigmoid bend. On account



Fig. 45.—Flap formation in a case of complete laceration of the recto-vaginal septum into the rectum. The scissor blade is splitting the vaginal from the rectal wall to form the flap, F, whose margin comes from the mucocutaneous line X, P; P, P, is the back cut; A to A, the opposite back cut; A, M, the anterior scissor clip.

of the position of the vagina, levator ani and pubic arch, the lower end of the vagina is dragged upward, producing its sigmoid curve forward, in the opposite

direction to that of the rectum. In other words, the plane of the pubic arch is anterior to the plane of the levator ani muscle, and when it contracts it must necessarily drag the lower end of the vagina upward and forward. These considerations may be appreciated by introducing the finger into the vagina and the thumb into the rectum. It is best studied first on a multipara and second on a nullipara, and third on one with a deficient vaginal sphincter apparatus. The closure of the vagina well forward toward the pubic arch produces a kind of valve, which acts almost as a certainty against prolapse while intact. This is one of the elements of success in both the Emmet and Tait perineal operations. The vast difference in appearance between the virgin and the relaxed vaginal sphincter apparatus of the multipara is due to the yielding of supports by the process of labor in nearly all cases (visceral ptosis excepted). This does not appear so strange when we consider that the virginal passage of the vagina is about an inch in diameter, while the passing head, shoulders and breech demand ten to twelve inches in diameter. It is not strange that tissues forced to stretch from one to twelve inches should forget to return. The levator ani muscle is arranged in fasciculi or bundles, or it would become defective more frequently. The sphincter and vaginal apparatus may be injured by external accidental trauma, but labor is the chief factor.

Relaxed vaginal outlet, concealed lacerations or deep musculo-fascial tears of the pelvic floor, can not be too forcibly brought to the notice of the physician as an important diagnostic indication for colpoperineorrhaphy. Kelly calls such, concealed relaxation. This is a condition of loose, gaping vulva, compared to the mouth of a bag without its puckering-string by Dr. Emmet. If the patient lie on the back the fork of the buttocks looks flattened, the anus appears

everted, and one may observe the vaginal mucosa bulging out above or below. The condition is frequently described as rectocele or cystocele, or both. Others call it perineal laceration. Some will write that it can not be perineal laceration, because the skin perineum is longer than the normal one. The skin perineum is longer than normal because, when it was stretched at labor, it never returned to normal (sub-

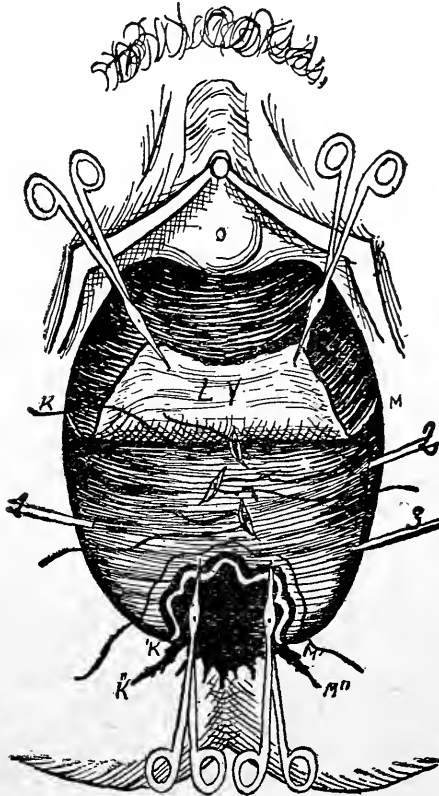


Fig. 46.—Advanced stage of the flap-splitting operation. L, V, anterior vaginal flap held up by forceps; the posterior rectal flap is held backward by forceps; the most posterior suture is placed along the margin of the torn rectum; other sutures are being introduced by being threaded in the median line and drawn out. Note that the needles do not penetrate the skin or mucosa.

involution). Occasionally one can introduce the four fingers of the hand and put the long relaxed perineum on a stretch. It is in these long, lax skin perinei that physicians disagree as to conditions, the one asserting that the perineum is plenty large enough and does not require an operation, while the other rightly asserts that the perineum is but a small part of the support of the sexual organs. The fact is, the whole vagina and sphincter apparatus has become deficient, the

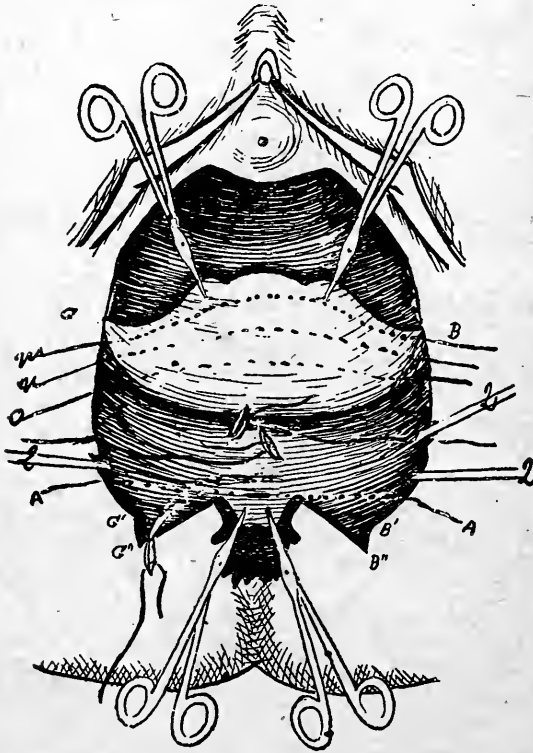


Fig. 47.—Another stage of flap forming. Observe that the most posterior suture is being introduced by the needle passing from one side of the denuded wound to the other, because the space is short, but the denuded surface under the flap is generally so wide that it is most practical to pass the handled needle from the lateral margin of the wound to the median line, where the needle is allowed to emerge and become threaded. Thus the sutures are passed through half of the wound at one time.



vulva pouts, the anus everts, and the floor of the pelvis flattens out. If the patient is requested to bear down, the anterior and posterior vaginal walls will roll outward, often to an astonishing degree. By the act of straining, the cervix can be felt descending. The patient has utero-ptosis. The sacro-pubic hernia is



Fig. 48.—Finished operation in a case of complete laceration. R, L, anterior end, and A, F, posterior end of newly-built perineal raphe; A, N, ossus ani is a little patent.

more marked if one examines the patient in the standing position. By careful inspection and palpation while the patient lies on the back, one may feel the retracted cicatricial stump ends of the lacerated levator ani muscle, and by irritating the little cicatricial elevated or depressed stumps we can see the contractions

and relaxations in them. Sometimes the perineum or lower posterior vaginal wall is so relaxed that it is large enough to close up the vulva like a valve. The horseshoe loop of the levator ani, which extends from one pubic ramus to the other, presents no more the resisting, broad, elastic loop felt in the virgin, but in the middle one feels an irregular sharp edge of

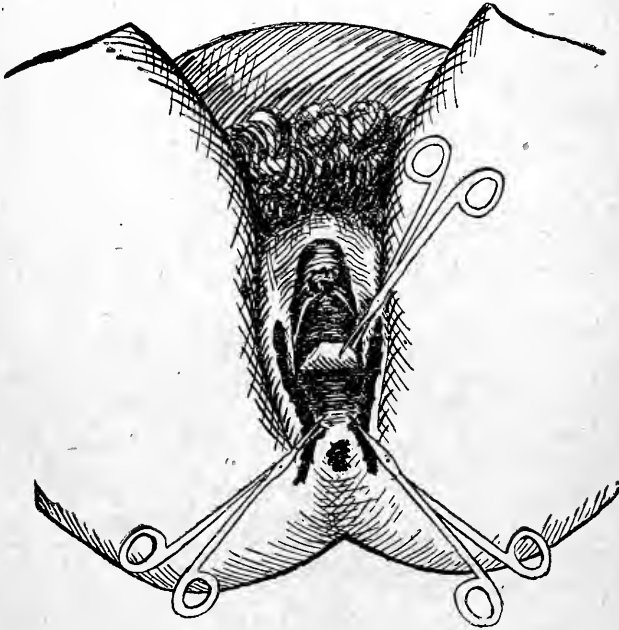


Fig. 49.—(Author.) Method of forming the flaps with a non-complete laceration, with anterior and posterior "cuts" and vaginal flap.

narrow dimensions. Also the loops of the levator are more displaced to the side of the vagina. Though the patient can generally control stool, yet the vigorous elasticity of the muscular loop is definitely impaired. With the patient on the back and the two index fingers in the vagina, one can quickly test the degree of deficiency of the sphincter vaginal apparatus by pressing downward and backward. The vulva

may pout with perineal skin intact, and the same may be said of the rectum. The fascia and levator ani may be quite defective on one side and intact on the other side. In very sensitive women, made worse by long-continued irritation, the examination is occasionally delusive, because reflex irritation puts parts on a tension.

We may classify the operations for colpoperineor-

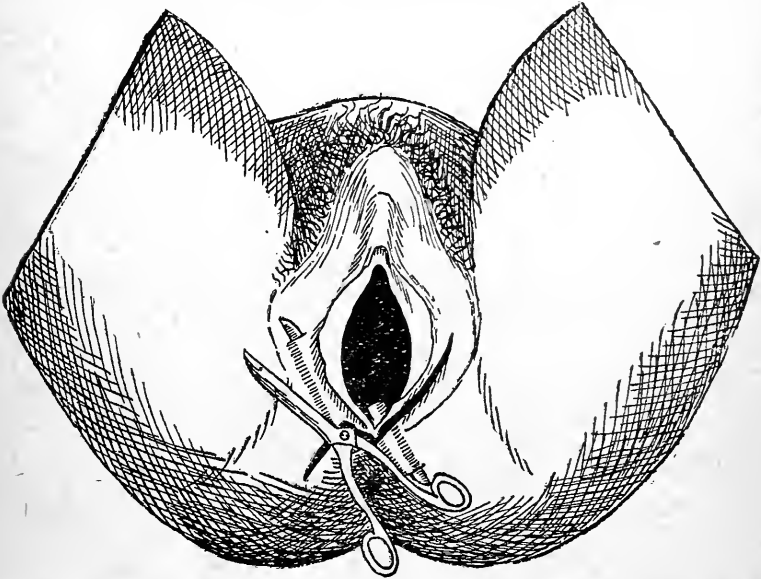


Fig. 50.—(Robinson-Scholer.) The flap formation. On the right the scissors are shown forming the anterior "cut;" on the left the blade of the scissors only is shown, forming the posterior "cut" beside the rectum.

rhaphy into three general divisions, viz.: posterior median colpoperineorrhaphy, posterior bilateral colpoperineorrhaphy, and the posterior flap colpoperineorrhaphy. Some of the principal originators and advocates of posterior median colpoperineorrhaphy were Dieffenbach, Langenbeck, Baker-Brown, Osiander, Simon, Hegar, Hildebrandt, Jobert, DeLambelle, Le Fort, Schroeder, Werth and Reamy.

The chief originators and promoters of bilateral colpoperineorrhaphy are Emmet, Staude, Freund, Martin, Bischoff, Goodell and Kelly. Some of the pioneer originators and advocates of the posterior flap colpoperineorrhaphy were Langenbeck, Duncan, Tait, Jenks, Voss, Simpson, Marcy, Colles, Sānger.

Whatever the apparent differences of the above three classes of procedure, all the advocates practi-

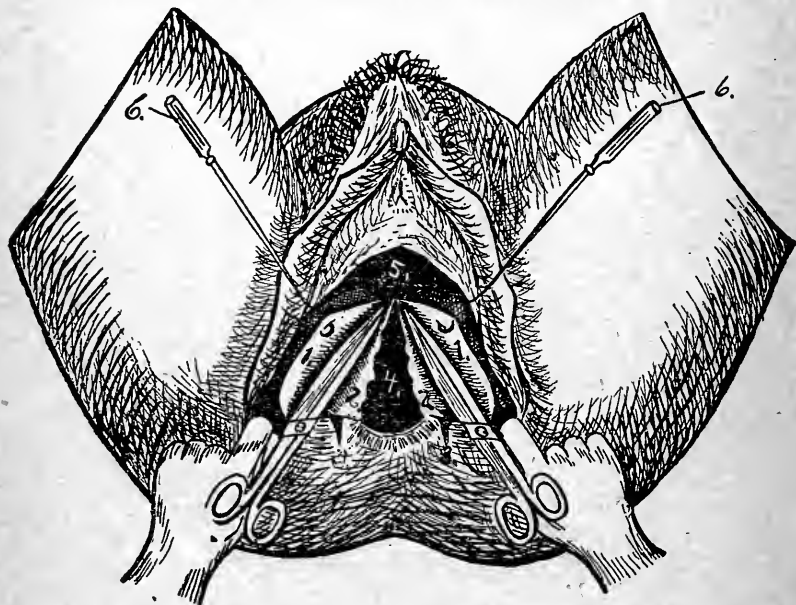


Fig. 51.—(Robinson-Scholer.) Flap formation with the scissors at the bottom of gutter between rectal and vaginal flaps. 1, 1, vaginal flaps held aside by the shepherd's crooks, 6, 6; 2, 2, rectal flaps; 3, 3, "back cuts;" 4, rectal lumen; 5, outline of cervix. This represents a complete laceration high up into the rectum.

cally agree that definite denudation (flap or otherwise), exact approximation of wound surfaces, and deep sutures (without tension), based on anatomic lesions, are the prerequisites of success. Methods and modifications are not so important as attention to anatomic and surgical principles. The physiology of

structure being disturbed by an overstretched perineum or elongated supports (enteroptosis), it must be restored by reproducing as near as possible anatomic integrity.

The relaxed tissue must be corrected with deep sutures and dissection; the blood-vessels must have a definite supporting bed in which to functionate; the peripheral nerves must be protected against continued

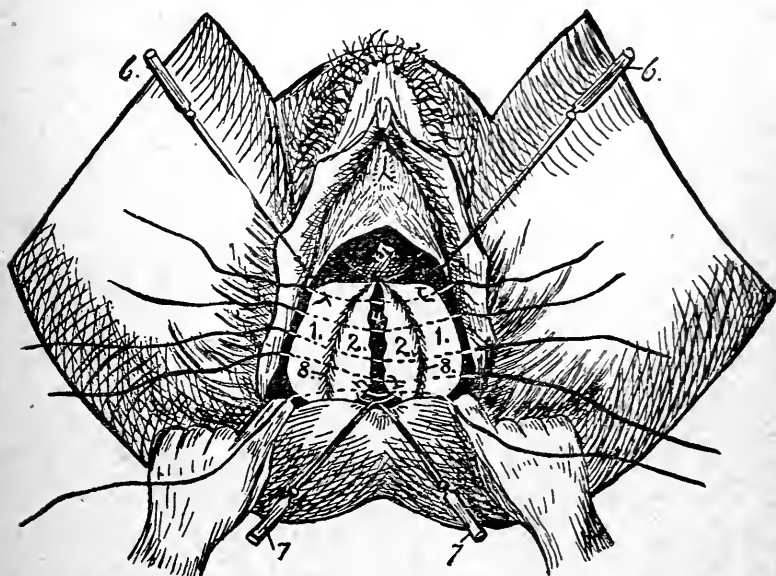


Fig. 52.—(Robinson-Scholer.) The sutures in position in a case of laceration high up into the rectum. 1, 1, the vaginal flaps held aside by the shepherd's crooks, 6, 6; 2, 2, rectal flaps held in place by the crooks, 7, 7; 8, 8, points to the line or angle of junction between the rectal and vaginal flaps.

repeated trauma, and the organs must assume a normal position, all of which belongs to the domain of colpoperineorrhaphy. The genius of Emmet established the utility of surgical procedure in the vaginal sulci. The grand operations of Bischoff sparing the posterior vaginal column (or median vaginal surface) foreshadowed and aided Emmet, as well as the schol-

arly labors of Schatz on the pelvic floor. As a pupil of A. Martin in 1884, I saw the contemporaneous and independent development of Emmet's operations in the vaginal sulci, in the hands of the most skilled gynecologic surgeons of Germany.

It may be remembered that the Emmet and Tait operations are alike valuable in operations for relaxed

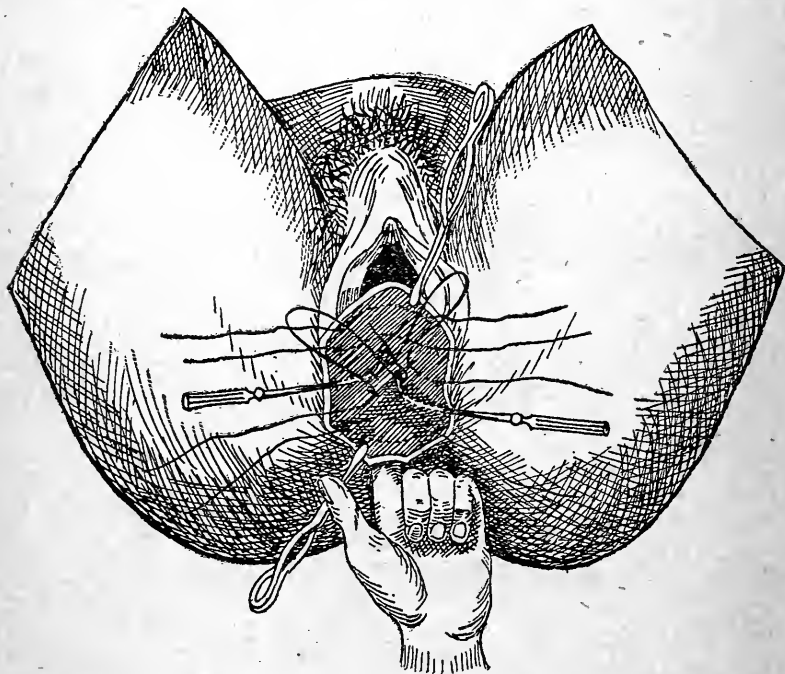


Fig. 53.—(Robinson-Scholer.) A case not ruptured into the rectum, in which the sutures are in position. The sutures are threaded from the median line, as seen in the cut. Observe that the sutures penetrate neither skin or mucosa.

vaginal outlet, with the advantage in the Tait operation of a flap to protect the wound. The reason Emmet's operation is about of equal value is that healing in the vaginal sulci is almost certain, hence but little danger of loss of valuable tissue by non-healing. Nothing is gained by denuding an area of vagina over

retaining that same area intact, for it will contract to its original size shortly after the tension which produced it is removed.

The rational symptoms resulting from lacerations requiring colpoperineorrhaphy are very numerous and varied, but they follow a logical sequence. In general the chain of symptoms is as follows: A local point of irritation—an infection atrium; reflex irritation which unbalances the other viscera (abdominal and

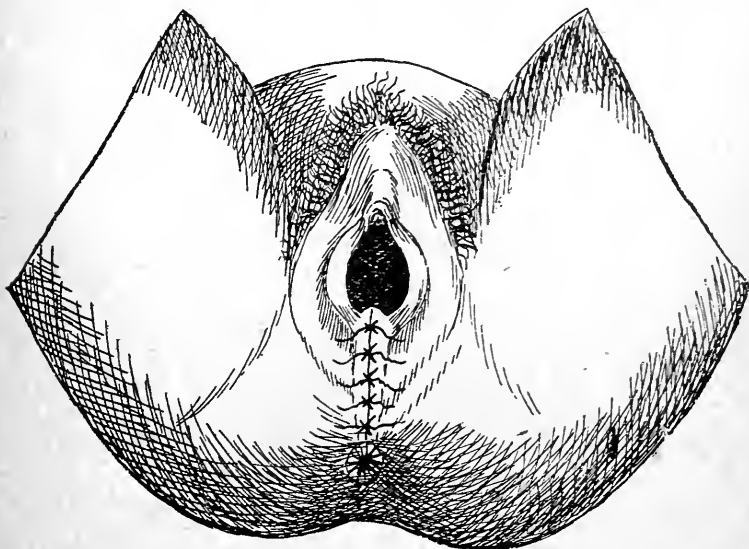


Fig. 54.—(Robinson-Scholer.) Completed operation on an incomplete laceration. Five sutures were employed.

thoracic). The irritation, from a focal point, travels up the hypogastric plexus, the ovarian plexus and the lateral chain of sympathetic ganglia to the abdominal brain and thoracic plexus, which aids in disturbing the visceral rhythm. Anatomic facts must be inspected. We find on each side of the uterus a large ganglion, a massive collection of nerve-cells which has been termed the cervico-uterine ganglion. We may call it the pelvic brain. An enormous mass of

nerve-cells—the abdominal brain—is found at the root of the celiac axis, just behind the stomach. Three great ganglionic masses of nerve-cells are found in the neck (superior, inferior and middle cervical ganglia), and a vast, intricate network of nerves in the heart—Wrisberg's plexus. Each of these large ganglionic nerve masses is in intimate and close commu-

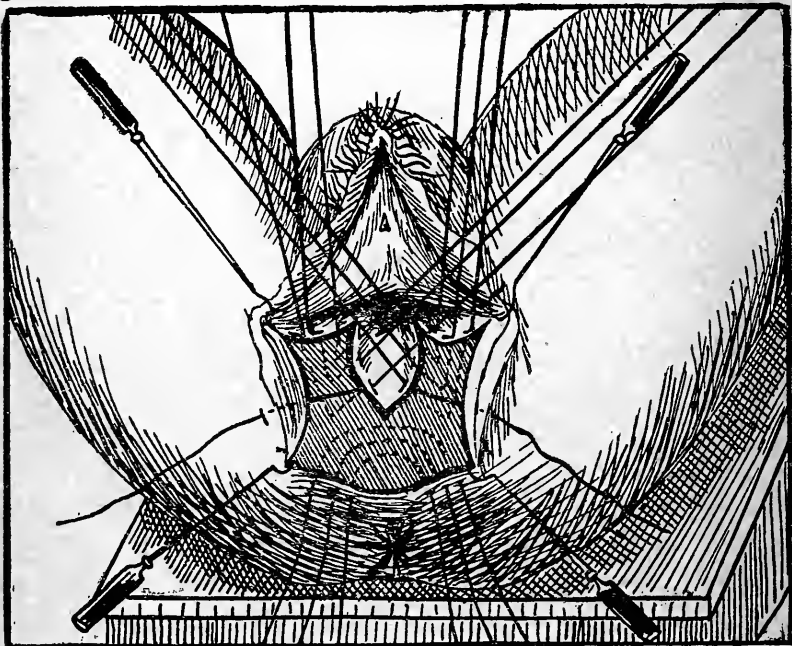


Fig. 55.—(Robinson-Scholer.) First stage of Dr. Emmet's operation, viz.: Denudation of the posterior vaginal wall; denudation of a triangle in each sulci of the vagina, with the noted method of his peculiar suturing.

nication with the genital organs. Many strands of nerves connect each ganglion with the pelvic viscera.

It is the numerous nerve strands which play the important rôle, because many strands, tracts, will carry many messages, and a few ganglion cells can take care of innumerable peripheral reports. A few ganglion cells will receive and dispose of many messages from many lines. Now the ganglion cells—the tho-



racic, abdominal and pelvic brains—assume a certain control over the rhythm of their respective viscera. Hence the viscus which is the most intimately connected to those three brains by many nerve strands will exercise significant power over the rhythm of the organs. One of the chief functions of a viscus is rhythm. If this be disturbed the organ becomes defective and fails in its final object.

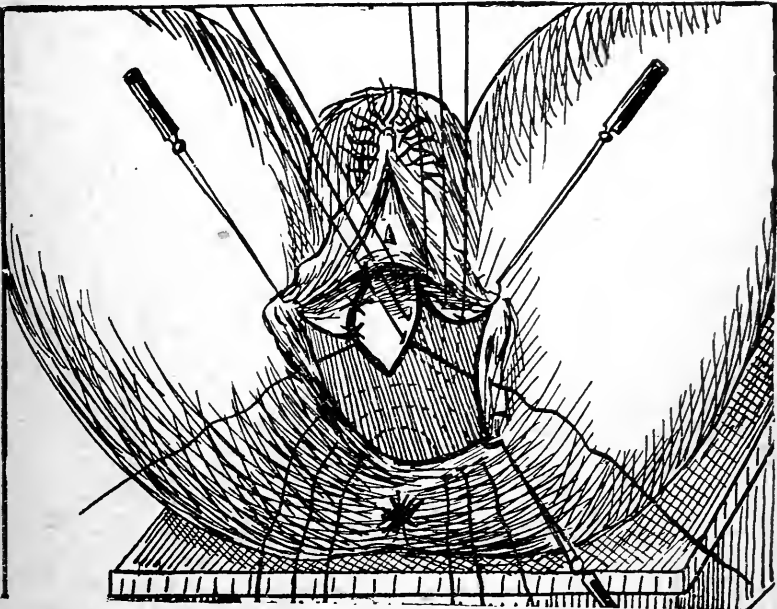


Fig. 56.—(Robinson-Scholer.) Another stage, in which the triangle in the right vaginal sulcus is closed with two sutures; sutures in position.

Let it be remembered that the irritation from a diseased organ is emitted at all times, without regard to physiologic rhythm by which the organ accomplishes its mode of life. The occasion of rhythm is the natural stimulus of an organ, as food for the digestive tract, air for the lungs, blood on the endocardium, urine in the urinary tract, a fetus in the uterus, fluids in the Fallopian tubes, and food material in the liver,

carried to it by the portal vein. If we follow a diseased message emitted from the pathologic genitals up to the abdominal brain over the lateral chain—the hypogastric ovarian plexus—where it is reorganized and emitted to the digestive tract, we may observe the following disturbances: Excessive secretion in the digestive tract; deficient secretion; disproportionate secretion. Excessive secretion may induce diarrhea;

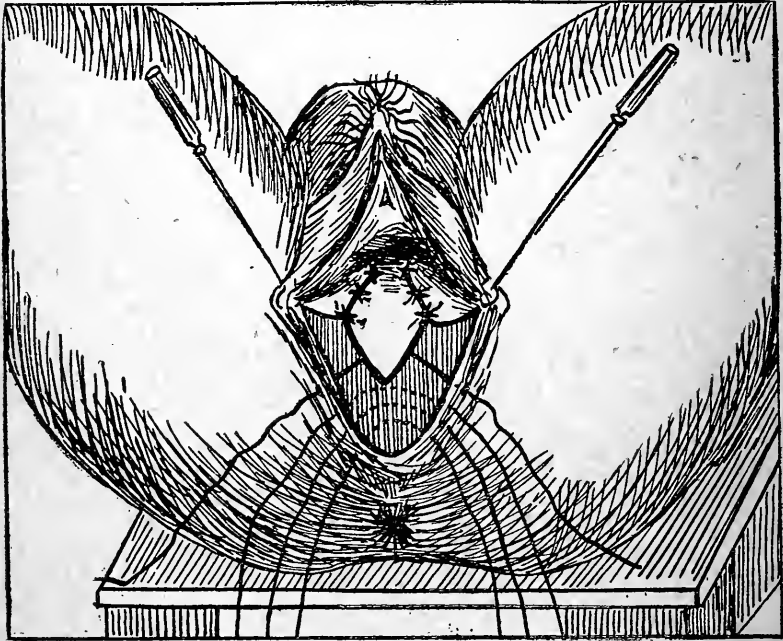


Fig. 57.—(Robinson-Scholer.) The two denuded triangles closed by sutures; the remaining sutures in situ.

deficient secretion; constipation; and disproportionate secretion may produce fermentation (bloating); the continuation of such reflex factors institutes indigestion. The reflex irritation, passing from the diseased genitals to the abdominal brain, is reorganized and transmitted to the liver over the hepatic plexus. This pathologic irritation produces excessive, disproportion-

tionate or deficient secretion in the liver. The liver secretes bile, glycogen and urea. It has a rhythm, just as the heart or lungs.

The transmission of pathologic irritation—reflex irritation—to the liver unbalances its rhythm and disturbs its secretion. If the rhythm of any organ be disturbed its function will soon become defective. For example, the rhythm of the small intestines is

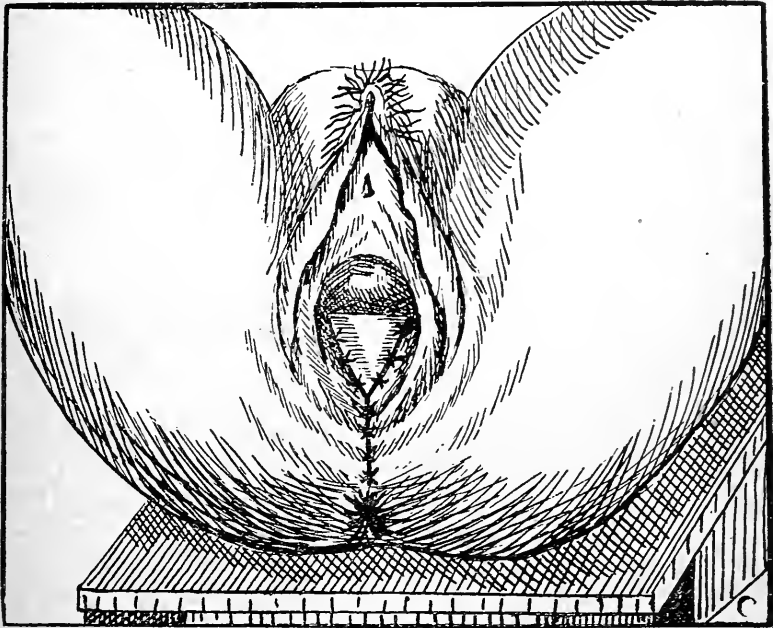


Fig. 58.—(Robinson-Scholer.) Operation finished. The Y-shaped line shows the line of suturing.

governed by the superior mesenteric ganglion, which induces a rhythm four to six times daily, according to food indigestion. Improper foods, disturbing the regular rhythm, soon induce indigestion. The descending colon, sigmoid and rectum (the fecal reservoir) is controlled by the inferior mesenteric ganglion, which makes a daily rhythm. The superior mesen-

teric ganglion has a four- to six-hour rhythm, while the inferior mesenteric ganglion has a 24-hour rhythm. Any one knows that disturbing the rhythm causes constipation, and eventually many neurotic symptoms arise. Long-continued indigestion produces malnutrition. Pathologic irritation passes to viscera at all and any times, in season and out of season, day and night, while organs are attempting to rest or to pass through a rhythm, always causing disturbances. Organs secure rest and repair between rhythms.

Malnutrition is followed by anemia—a disproportion between the blood-vessels and plasm. Long-continued anemia is followed by neurosis. The numerous ganglia are bathed in waste-laden and irritating blood. Innumerable local and distant neurasthenic conditions are manifest. We have, then, as a train of evil symp-



Fig. 59.—Author's perineorrhaphy needle.

toms following genital defects: 1, local irritation—an infection atrium; 2, reflex irritation to the abdominal brain, where it is reorganized and sent out to the various viscera; 3, indigestion and malnutrition; 4, anemia; and 5, neurosis.

In the incomplete cases of laceration the disturbance is attributed to gaping of the vulva and the consequent favoring of rectocele and cystocele. This condition is followed by uterine prolapse, endometritis and metritis. The patient suffers from ill-defined pains while standing and walking. These patients complain in a manner similar to that of those who are afflicted with enteroptosis. When the lacerations become complete, not only a physical defect of control of feces and gas exists, but a train of mental symptoms follow complete lacerations or serious lesions and gravely affect

life, both physically and mentally. The patient is easily fatigued, neurotic constantly, liable to exacerbation of infectious processes.

One of the most unfortunate results of extensive laceration of the rectovaginal septum is diarrhea. When the sphincter muscles have been so far drawn apart at the ends that they are almost a straight line, the rectum has lost all control of feces. A straight sphincter is a symptom of complete laceration; the diarrhea accompanying the straight sphincter is very exhausting. The amount of separation in the sphincter muscle tells the story of the degree of laceration. When one can find the deep dimples in the skin, on each side of the gaping vulva, due to the cicatricial ends of the muscular bundles contracting, it may be estimated that the vaginal sphincter is extremely defective and that over half of its arc is wide open. Only a carefully planned operation can relieve this condition. The widely gaping vulva is exposed to much trauma and consequent infectious processes. The congested genitals and rectum produce excessive glandular secretion, which furnishes a culture medium not only to the pathogenic bacteria, but tends to multiply the regular residents of this locality into excessive number, and in all probability dangerous kinds, for doubtless bacteria rapidly change from one kind to another by change of food and temperature. It would be strange indeed if all the scores of uterine tubular glands could long remain normal with frequent congestions and decongestions. Excessive bacteria in any locality must produce their dangerous toxins, which become absorbed and carried away by the veins and lymphatics. The rectal veins are known to stand in direct communication with the liver by way of the valveless portal system. Hence may be observed the vicious circle established by the defective sphincter apparatus of the vagina. Again, con-

sider the innumerable reflexes which must necessarily arise from the infected, frequently congested, occasionally acute, inflammatory invasions of the genito-rectal organs. These reflexes arise in all degrees and conditions, and the patient almost imperceptibly passes through the stages of indigestion, malnutrition, anemia and neurosis. Again, many of these patients are operated on by inexperienced surgeons, with consequent imperfect results. Then a conflict of opinion arises as to the perineal defect being the cause of the trouble or whether the etiology is to be located in the nervous system, for one of the evils of today is the confounding of nervous and genital diseases. After an imperfect operation on the genitals, with a consequent imperfect result, the operator is liable to throw the whole defect on the nervous system. As the nervous system and the liver are the chief scapegoats of ignorance (and knavery) it is difficult to demonstrate the error. It requires wisdom, knowledge and experience to discriminate between genital diseases and their consequent train of neurotic effects, and the diseases which definitely belong to the nervous system itself or to other causes than the genitals. I must insist, however, that this requires more time and skill than any general surgeon or physician is able to give.

Until one comprehends the practical anatomy, it is almost impossible to interpret the rational symptoms of the deficiency of the supports of the sexual organs. The popular view of general physicians that the perineal body is the chief support is one illusion which I find, after considerable experience in teaching, difficult to eradicate. It is the indefensible mechanical theory that the perineal body is the keystone, the cork which stops the bottle, or the wedge which plugs up the pelvic outlet. Unfortunately, a prominent American gynecologist at one time abetted this false theory.

One of the very common diseases accompanying perineal lacerations is endometritis. Little need be said to defend or explain this condition, for it is evident to all observers how the endometrium may be insulted by trauma, congestion and bacterial invasion, when unduly exposed from deficient support. Excessive glandular secretion arises; leucorrhea, which may be non-infective, then pathogenic infection soon follows with its consequent train of evils.

This leads me to a subject of vast importance. It is the metritis (subinvolution) which so frequently accompanies laceration of the perineum. The general practitioner calls it subinvolution. But we will call it metritis, because we believe it to be of microbic origin. Be it remembered, the uterus above all organs is liable to infection, because its glands pass directly into its muscular walls. It has no submucous layer or barrier to protect the muscle. The intestine has a submucous muscular layer which acts like a barrier against microbe invasion. But the uterus has no muscularis mucosæ. It has no barrier between its glandular apparatus and its muscular apparatus, so that microbes or their products which gain the uterine glands soon gain the muscular walls of the uterus and produce metritis. Hence metritis is one of the frequent accompaniments of perineal laceration, and as metritis is a very chronic disease, it is apt to continue even beyond the repair of the perineal injury.

From this short view it may be observed that the rational symptoms of injuries to the pelvic floor are generally a train of evils which increase with time, and the final brunt is most apparent in the nervous system. Many of the symptoms can only be accounted for by carefully noting the many cases of invisible lacerations—the relaxed pelvic floors, perineal supports and sphincter vagina apparatus—which disturbs circulation by the vessels being torn from their proper

fascial beds, the veins becoming elongated, dilated, straight, and losing their normal spiral form, and the nerves being put on the stretch or traumatized.

We thus have disturbed vascularization; congestions and decongestions of blood and lymph have also disturbed innervation from traumatized nerves. Enteroptosis exists and the avenues of infection are widely exposed. The supports of the pelvic floor have been overstretched by one or more labors and have not resumed their normal integrity. On examining such patients, as Schatz points out, the normal anal cleft is flattened out, the dent and furrow becomes broad and shallow and the anus, instead of being drawn up under the pubic arch, appears flat, exposed, and fallen back toward the coccyx. The skin perineum may be much larger than normal, being overstretched. The finger introduced into the vagina no more feels the rigid levator ani muscle loop, but in its stead the relaxed, overstretched, flabby tissues lying between the gap made by the separation of the levator ani fascia superior and inferior with its contained muscle in various degrees. Perhaps there is no lesion more overlooked in the pelvic floor by the general practitioner than the relaxed, overstretched outlet. In 1883 Emmet and Schatz first clearly announced their views in regard to relaxed pelvic outlet. The very deep perineum is deficient, while the shallow, short one is the vigorous one. The patient with relaxed pelvic outlet generally begins to complain of bearing-down symptoms on rising from bed some two or three weeks after labor. She feels weak, unable to work or exert herself, pain in the back, general lassitude and prostration.

The relaxed pelvic floor is most impressive to the operator, by examination before and after the anesthetic, when he is about to operate. Before the anesthetic the pelvic outlet is held in partial tension by



the remnants of the muscular and fascial supports; the loops of the levator ani muscle being irritated by the non-balance of parts being torn, the patient is constantly losing nerve force by the attempts of the reflex irritation in keeping up the tension. When the patient is fully anesthetized the parts of the pelvic floor show vast relaxation and it becomes at once apparent to the hand and eye of the operator that a significant defect exists, beyond his expectation, in the sexual apparatus. The perineum falls back, the anus flattens and everts, the vaginal walls roll outward, and the deep anal furrow assumes a plane approximating that of the buttocks. Vast changes in subcutaneous and submucous supports have occurred, capable of being repaired only by an operation which restores vessels to a stable bed, nerves to a protected sheath, and organs to a position which will insure normal circulation and innervation—in short, proper nourishment. With such patients in the erect posture the intra-abdominal pressure is continually displacing the viscera by forcing them into and through the weakened pelvic outlet. The pelvic outlet, beyond the normal floor is full of prolapsing organs which often deceive the practitioner by closing up the gap.

The length of time allowed to relapse between the injury and the operation on the perineum should not be less than three months. The parts do not heal well shortly after labor. Old gynecologists, as Byford, recommended at least six months to elapse before the operation should be performed. Perhaps four months after injury it would be fairly safe to operate. The old cicatrix can not always readily be found, but by pulling on the vagina in various directions the puckering tissue about the scar will be discovered. The palpating finger may also find it.

The cicatrix produces new points for the attachment of the torn fibers of the levator ani muscles

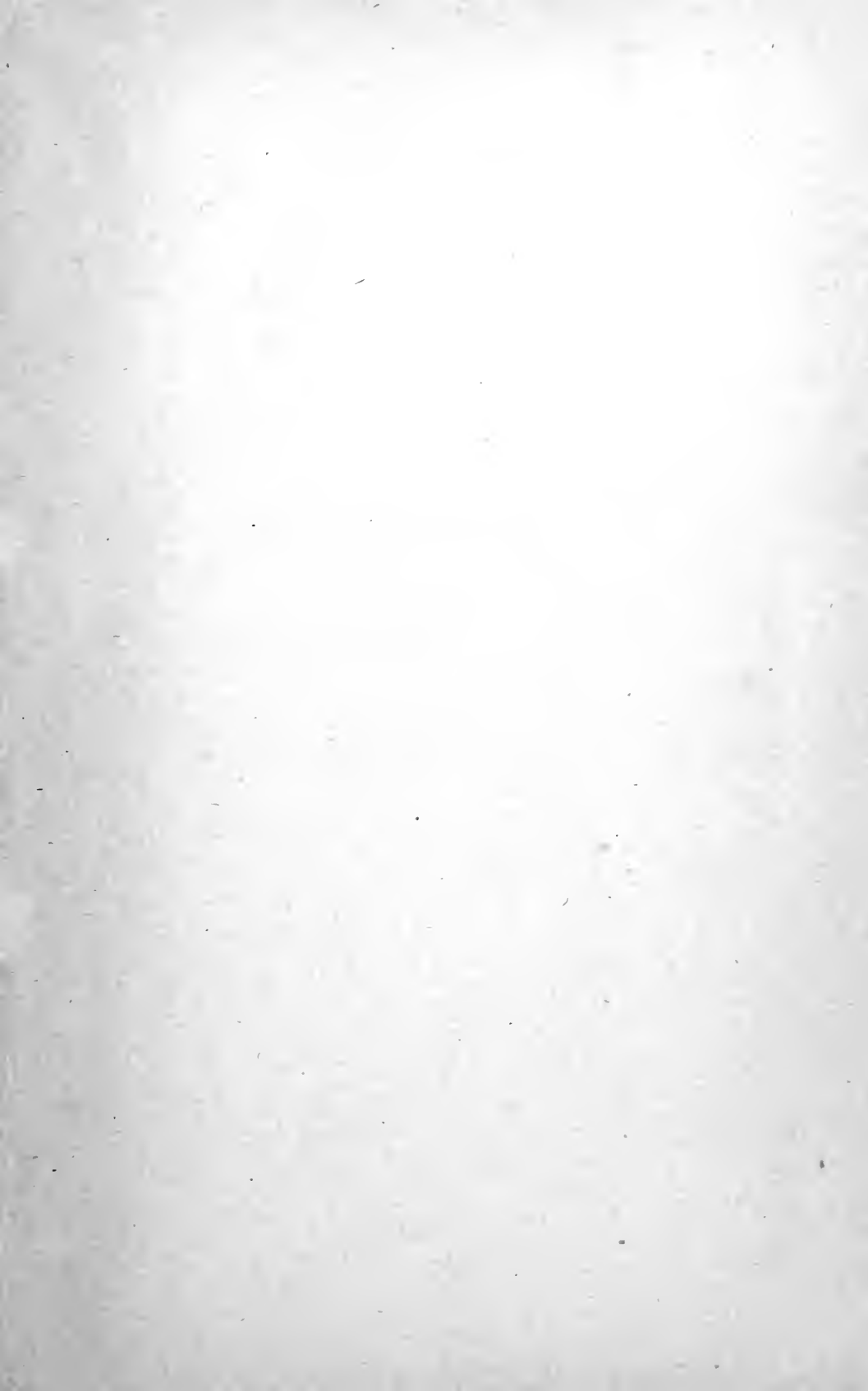
which may give the outlet a peculiar, irregular, puckered appearance when the muscular bundles contract from their new points of attachments. The flap formation should extend beyond the cicatrices so that the ends of the muscular bundles may be included in the sutures. The time for operation should be midway between the menstrual periods.

In regard to the perineal body: The posterior curve of the vagina must be reproduced by restoring the rectovaginal septum.

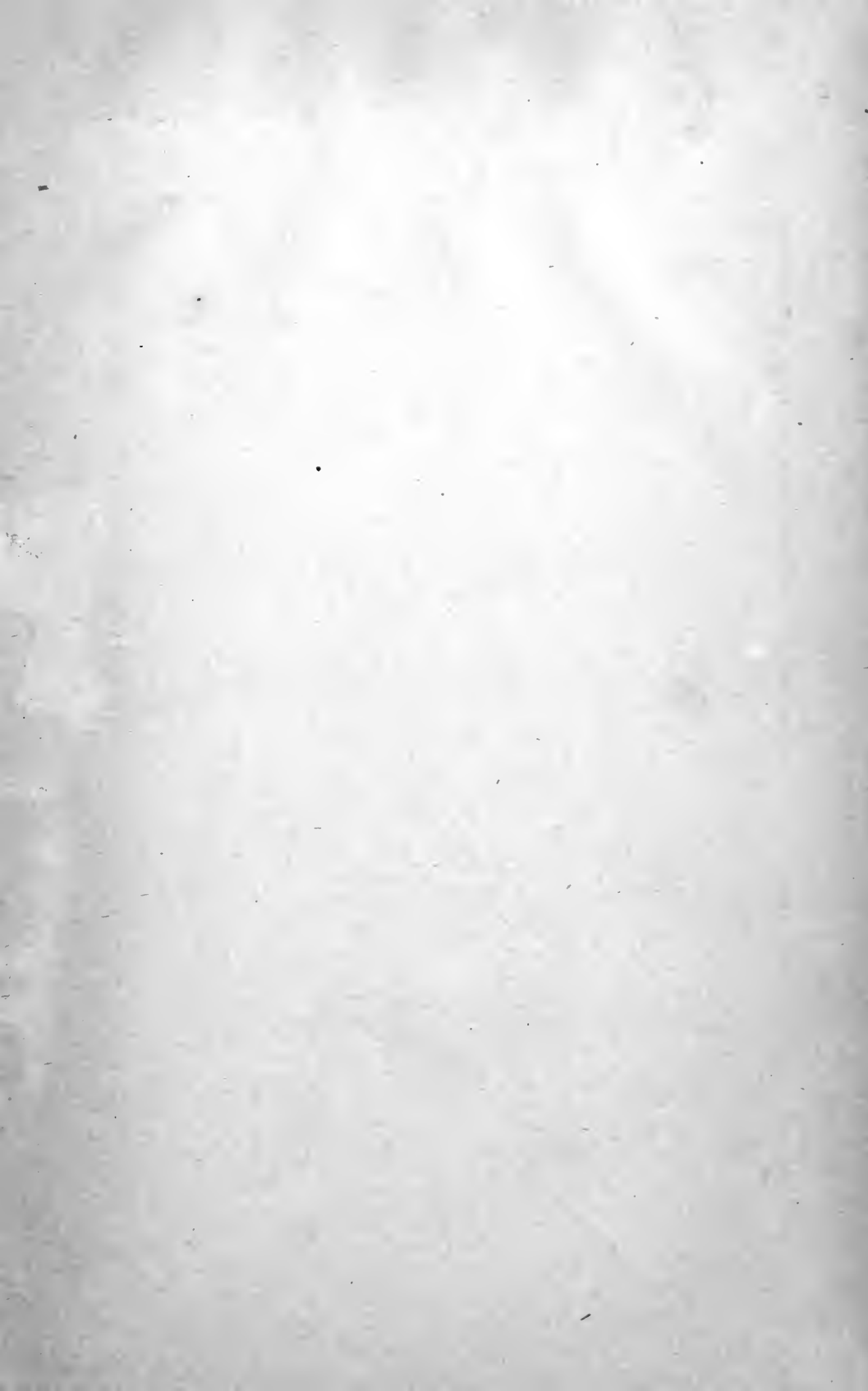
A new perineal body should be restored, so that the natural backward curve of the vagina should persist, i.e., normal relations should be established between the perineal center of body on the one hand and fascia on the other. The perineal body, the punctum fixum of vulvar surface relations, should be restored.

In writing this essay I have derived aids and suggestions from all accessible authors and have attempted to duly credit the labors.

Some suggestions were acquired in regard to drawings from the book of W. J. Stewart McKay.







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